**U.S. DEPARTMENT OF TRANSPORTATION**
**FEDERAL AVIATION ADMINISTRATION**

---

# NATIONAL AIRSPACE SYSTEM (NAS) AERONAUTICAL INFORMATION MANAGEMENT ENTERPRISE SYSTEM (NAIMES)

# CONCEPT OF OPERATIONS (CONOPS)

# SUPPORTING THE NATIONAL AIRSPACE SYSTEM AND DEPARTMENT OF DEFENSE (DoD)

**November 8, 2005**

---

**Federal Aviation Administration**
**System Operations Services**
**NAIMES Program Office**
**ATO-R**

**THIS PAGE INTENTIONALLY LEFT BLANK**

## Revision History

| VERSION | DATE | DESCRIPTION | AUTHOR OF CHANGE |
|---|---|---|---|
| 2.0 | Apr 21, 2005 | Updates to all sections | Alan Hayes |
| 3.0 | Oct 18, 2005 | Updates to all sections and formatted document in accordance with IEEE Standard 1362-1998 | Alan Hayes |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Table 1. Revision History**

**THIS PAGE INTENTIONALLY LEFT BLANK**

# Preface

This is the Concept of Operations (CONOPS) document for the National Airspace System (NAS) Aeronautical Information Management Enterprise System (NAIMES). The NAIMES CONOPS is a user-oriented document that describes the NAIMES system characteristics from the users' viewpoint.

The Federal Aviation Administration (FAA) is responsible for insuring the safe, efficient, and secure use of the Nation's airspace, by military as well as civil aviation, for promoting safety in air commerce, for encouraging and developing civil aeronautics, including new aviation technology, and for supporting the requirements of national defense.

The FAA has three key mission goals:

- Safety—By 2007, reduce U.S. aviation fatal accident rates by 80 percent from 1996 levels
- Security—Prevent security incidents in the aviation system
- System Efficiency—Provide an aerospace transportation system that meets the needs of users and is efficient in the application of FAA and aerospace resources

The NAIMES Program contributes to the accomplishment of all of these goals. NAIMES Program objectives are consistent with the goals of NAS modernization—to increase safety, accessibility, flexibility, predictability, capability, efficiency, and security.

NAIMES is a NAS program managed by the FAA, Air Traffic Organization (ATO), System Operations Services (ATO-R) that consists of closely integrated systems and services located at the Air Traffic Control System Command Center (ATCSCC) in Herndon, VA with a remote site located at the National Network Control Center (NNCC) in Salt Lake City (SLC), UT that collects, validates, manages, and disseminates aeronautical information.

NAIMES provides worldwide sharing of aeronautical information (AI) for internal FAA and other government agencies, the international aviation community, the Department of Defense (DoD), domestic commercial air carriers, and general aviation customers. NAIMES directly supports Traffic Flow Management (TFM) and Collaborative Decision Making (CDM) in the NAS and for the Military.

NAIMES provides scalable, standards-based, high-reliability systems and network-centric services designed to provide users with secure real-time access to critical aeronautical information, essential for domestic, military, and international aviation operations. Using existing FAA and DoD infrastructures, NAIMES enables multiple customers to share information by linking individual systems together. NAIMES seamlessly and securely connects users with the NAS information that they require at near real-time speeds. NAIMES directly supports the NAS Architecture Version 5.

NAIMES operational information and data distribution systems currently supporting the NAS include the following:

- **US Notices to Airmen (NOTAM) System (USNS) (Joint FAA/ DoD)**
  - USNS Master Database
  - NOTAM IP / NOTAM Distribution System (NDS)--NOTAM Data Distribution to Air Traffic Control Towers (ATCTs), Federal Contract Towers (FCTs), Terminal Radar Approach Control (TRACON) facilities, and Flight Service Stations (FSSs)
  - NOTAM Entry System (NES)
  - Graphical Temporary Flight Restrictions (GTFR)/ Special Use Airspace (SUA)
  - Defense Internet NOTAM Service (DINS)
  - National Operational Data Archive (NODA) & Database Master
- **NAS Fixed Asset Data**
  - NAS Resources (NASR) and eNASR (web-services version of NASR)
- **Data Access Portals (and associated services)**
  - Aeronautical Information System – Replacement (AISR) (Joint FAA/DoD)
  - ATCSCC Domestic Web System (Aeronautical Information Distribution/Portal)
  - PilotWeb (General Aviation (GA) Website)
  - Aeronautical Integrated Data Access Portal (AIDAP) (604 Circuit Replacement)
  - CDM
  - NAS Gateway
  - Extensible Markup Language (XML) Interfaces for Air Mobility Command (AMC), Military Operations (MILOPS), Operational and Sustainability Implementation System (OASIS), and En Route Information Display System (ERIDS)
- **Capstone/Wide Area Augmentation System (WAAS)/ Global Positioning System (GPS)**
  - Capstone/WAAS (System Availability – Alaska and NAS-wide)
  - GPS Outages (USNS and DINS)
- **Flight Information (Data Link)**
  - Safe Flight 21 (SF-21)
  - Flight Information Services (FIS) Data Link (FISDL)
- **DoD Specific Systems**
  - DINS
  - Central Altitude Reservation Function (CARF)

- **Other Flight Planning and Information Systems**
  - "Airline" Traffic Query System (A-TQS)—Enhanced Traffic Management System (ETMS)
  - FlightAssist (PC-based Flight Planning Application)
- **Program and Infrastructure Services**
  - NAS Qualified Internet Communication Provider (QICP) certified Internet Access Point (IAP)
  - ISP for NAS Systems and facilities (ETMS, NAIMES, ATCSCC, etc.).
  - SLC remote site
  - NAS Network Information Center (NIC) (NAS FAA Internet Protocol (IP) Routed Multi-user Network (FIRMNet) and Future Telecommunications Infrastructure (FTI) IP address assignment)
  - NAS Domain Naming Service (DNS)
  - NAIMES Technical Support Help Desk

The NAIMES program is the authoritative source for CAPSTONE/GPS/WAAS availability, NOTAMs, NAS Resource, and weather data for NAS and DoD users. In addition, NAIMES is an official source of Flight Plan messages and processes NADIN messages. NAIMES provides web services and data portal capabilities with guaranteed delivery of information to Towers, TRACONs, Air Route Traffic Control Centers (ARTCCs), and to the ATCSCC.

NAIMES is an "enabler", providing customers and stakeholders with "one-stop" access to critical products and services. NAIMES facilitates the transition of NAS operations from the legacy system-centric (point-to-point) to network-centric (point-to-cloud) by utilizing both new and existing infrastructure, and developing associated policies and standards. Unlike other NAS-wide "middleware" efforts, NAIMES provides full connectivity support for legacy customers.

The NAIMES service-oriented architecture is essentially a collection of automated services. These services communicate with each other via Web Services. The communication may involve either simple data passing or it could involve two or more services coordinating some activity to provide a value-added product. Connectivity between services is also provided.

The NAIMES Communications Services diagram (Figure 1) provides a high-level view of the NAIMES infrastructure. NAIMES provides services and support (shown within the dark gray box) using the latest standard protocols and formats to its FTI, Non-secure Internet Protocol Router Network (NIPRNET), and Internet customers.

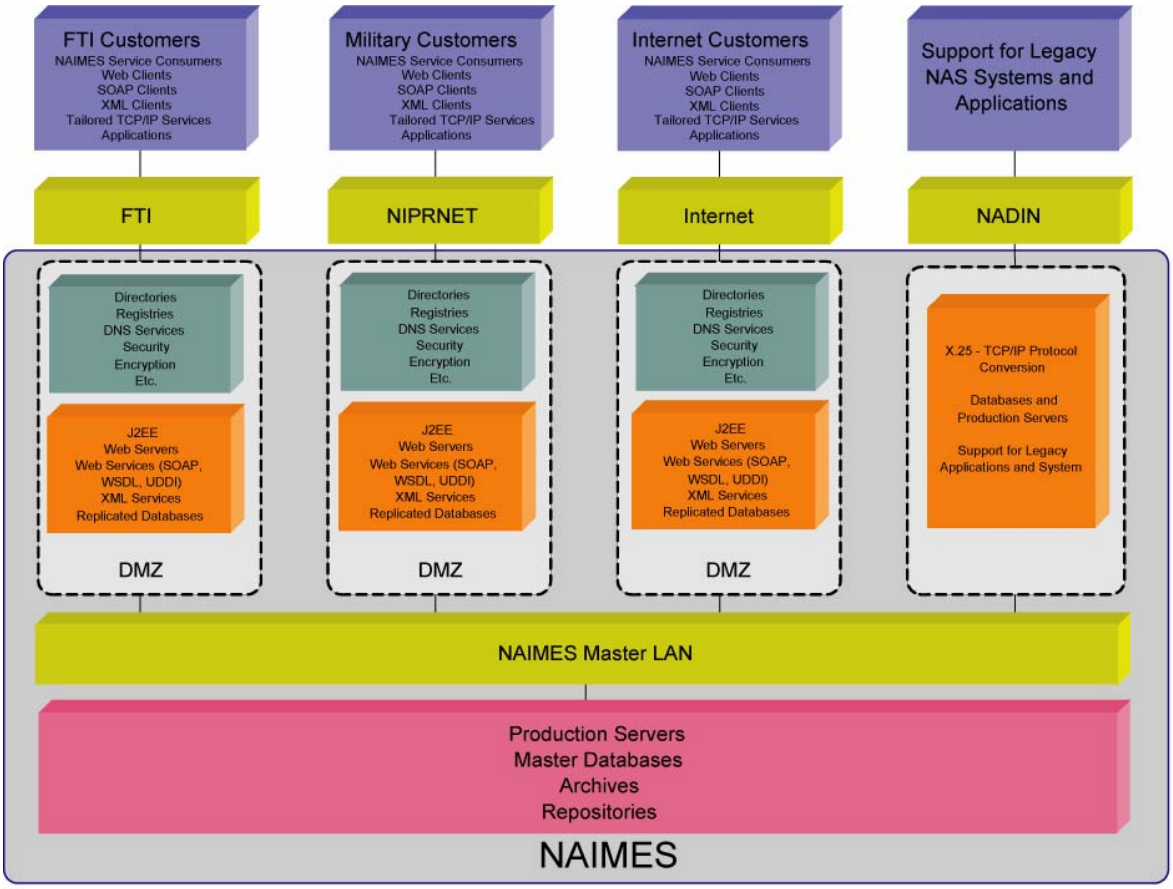


**Figure 1. NAIMES Communications Services**

Supported NAIMES protocol and standards include:

- NAS Aeronautical Information Language (NAIL) (Aeronautical Information Exchange Model (AIXM)/Aeronautical Information Conceptual Model (AICM))
- XML
- Service Oriented Architecture Protocol (SOAP)
- Common Object Request Broker Architecture (CORBA)
- Structured Query Language (SQL)
- Hypertext Telecommunications Protocol (HTTP)
- Secure Hypertext Telecommunications Protocol (HTTPS)
- IP Version 4 (IPv4)
- IP Version 6 (IPv6)
- Domain Name System (DNS) services
- X.25
- International Civil Aviation Organization (ICAO)

NAIMES web services allow for cross-platform interoperability today. NAIMES also provides support for legacy systems and applications using National Airspace Data

Interchange Network (NADIN) and the X.25 protocol. NAIMES can provide protocol conversion between X.25 and Transmission Control Protocol/Internet Protocol (TCP/IP) protocols thereby bridging the gap between old and new protocols and allowing a path to migrate away from legacy NAS applications to modern applications and protocols. NAIMES provides separate De-militarized Zones (DMZs) for the FTI, NIPRNET, and Internet domains to enhance the security of the systems and keep data integrity and availability high. NAIMES also operates the only approved Internet Access Point (IAP) for the NAS—NAIMES is the "Gateway to the NAS." The NAS IAP was also the first system QICP certified by the FAA.

NAIMES is a founding member of the FAA Aeronautical Information Management (AIM) Working Group. Since 2002, NAIMES has implemented significant portions of the System-Wide Information Management (SWIM) concept.

NAIMES uses the spiral development methodology to develop and field capabilities. By using with this approach, NAIMES can incrementally and quickly incorporate new technologies into its systems, rather than delivering monolithic solutions using only those technologies that existed when the systems were initially designed. Spiral development increases flexibility and efficiency, streamlines the development cycle, and delivers the capability much faster. This approach also significantly lowers the cost of fielding the desired capability.

NAIMES is global in scope and receives or provides data to all NAS and aviation community systems and users (i.e., both domestic, US military and international) that use or handle aeronautical information. NAIMES operational aeronautical information impacts all phases of flight including preflight activities, filing/amending/canceling flight plans, departure (taxi and takeoff), en route and/or oceanic navigation, and arrival (final approach and landing) phases as shown in Figure 2. From preflight activities to landing, access to current meteorological conditions and aeronautical information is essential to pilots, controllers, and the entire aviation community.

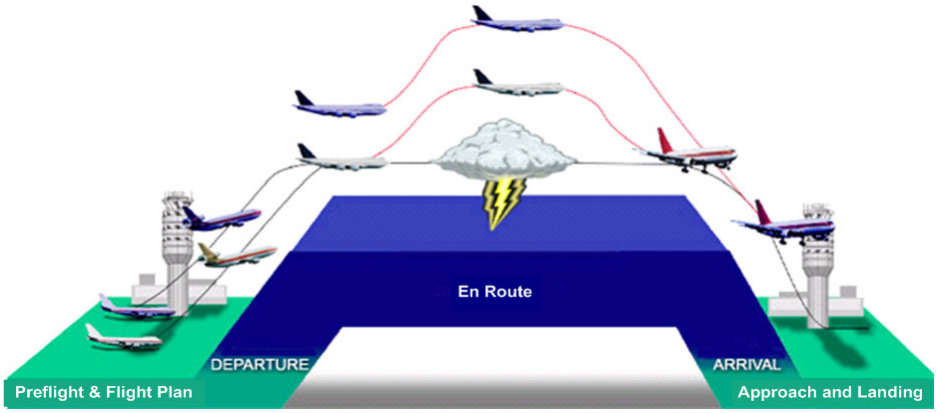


**Figure 2. Phases of Flight**

NAIMES allows for the sharing of information from disparate systems that will result in cost savings and better NAS information management. NAIMES transforms data and information from legacy systems into a rich resource of useful information for users of aeronautical information. NAIMES also provides a pathway to migrate away from legacy systems and protocols. NAIMES has been consolidating "stove-pipe" legacy information systems to provide a more efficient means of receiving and delivering aeronautical information to the varied user communities. The consolidation of legacy information systems into NAIMES when they become obsolete results in additional cost savings to the FAA. Over the past several years, NAIMES has rehosted the USNS on Sun MicroSystems hardware using the Oracle Relational Database Management System (RDBMS) and other advanced technologies such as IBM's WebSphere and the Java 2 Platform, Enterprise Edition (J2EE), consolidated the Aeronautical Information System (AIS), and is providing AIDAP--the 604 Circuit replacement.

Current NAIMES activities include the following:

- En Route Automation Modernization (ERAM) Program interface
- Flight Service 21 (FS-21) Program interface
- NAS Gateway to provide a secure interface for external users, such as airlines, to access data from NADIN
- DoD's Joint Mission Planning System (JMPS)
- Developing the NAIL that includes flight planning and other FAA & DoD-specific enhancements as superset of the AIXM
- Development and implementation of FlightAssist, A Windows-based automation tool that graphically displays proposed flight plans before submitting them to the NAS

NAIMES is an operational system that works today to ensure aeronautical information from the FAA NAS systems and those of the NAS community, such as airlines, other government agencies, international users, and the military, is available on a real-time, secure basis to all authorized users.

# Table of Contents

# List of Figures

# List of Tables

**THIS PAGE INTENTIONALLY LEFT BLANK**

# 1 SCOPE

## 1.1 Identification

This is the Concept of Operations (CONOPS) document for the National Airspace System (NAS) Aeronautical Information Management Enterprise System (NAIMES).

## 1.2 Document Overview

The NAIMES CONOPS is a user-oriented document that describes the NAIMES system characteristics from the users' viewpoint. The purposes of the NAIMES CONOPS are to:

- Identifying current and future user needs for aeronautical information services and products
- Communicate users' needs for and expectations of NAIMES to developers
- Communicate the developers' understanding of the users' needs and how the system shall operate to fulfill those needs.
- Describing the current and future operational environment, including roles, capabilities, and basic operating principles
- Identifying how these components can grow together to provide a common entry and distribution point of data for NAS users

The CONOPS document is used to communicate overall quantitative and qualitative system characteristics to the users, developers, and other organizational elements from an integrated systems point of view. The NAIMES CONOPS is based upon the Institute of Electrical and Electronics Engineers (IEEE) Standard 1362-1998, *IEEE Guide for Information Technology System Definition—Concept of Operations (CONOPS) Document.*

The NAIMES CONOPS bridges the gap between the users' needs and the developers' technical specifications. The NAIMES CONOPS describes the users' operational needs from a high-level perspective without becoming bogged down in technical details (although some discussion of technical concepts is necessary to describe the system). The CONOPS provides a mechanism for documenting a system's characteristics and the users' operational needs in a manner that can be verified without requiring any technical knowledge beyond that which is required by the user to perform normal job functions. The CONOPS allows for the expression of users' needs using both qualitative and quantitative terms. For example, users could express their need for a "highly reliable" system without having to provide a testable reliability requirement or they could state their requirements using quantitative, testable specifications.

The audience for the CONOPS includes:

- Users who should read it to determine whether their needs have been correctly specified and to verify the developers' understanding of their needs
- Developers who will use the CONOPS document as a basis for system development activities and to familiarize new team members with the problem domain and the system to which the CONOPS applies

This document presents the NAIMES program's activities and goals for implementing systems to manage the National Air Space and relevant data.

## 1.3 System Overview

This section presents NAIMES' purpose, general nature, project sponsors, user agencies, development organization, support agencies, and operating centers.

NAIMES is a NAS program managed by ATO-R that consists of a number of automation systems and services that directly support the collection, validation, management, and dissemination of aeronautical safety information. The NAIMES mission is to collect, process, and distribute aeronautical information to FAA, DoD, and civil customers in support of Air Traffic Control (ATC) operations. NAIMES supports the FAA's mission to promote aviation safety and also contributes to increases in the security, performance, and capacity of the NAS. NAIMES is an FAA safety-critical/mission essential system and a DoD mission critical system.

NAIMES collects NOTAM messages and aeronautical information from the NADIN X.25 Packet Switched Network (PSN), the DoD Automatic Digital Network (AUTODIN), the FTI operational network, and the FTI administrative network (formerly the Agency Data Telecommunication Network (ADTN)), DoD NIPRNET, and Internet sources. NAIMES also collects, processes, and distributes weather data, WAAS/GPS availability, flight plan messages, and other information. NAIMES provides aeronautical information portal capabilities and data distribution to various locations, systems, and networks. NAIMES provides accurate and timely operational aeronautical information data and services to pilots, other airmen, air traffic service providers, air traffic managers, other government agencies, industry, and international organizations supporting national and international aviation operations. NAIMES is the authoritative source for NOTAM messages, AISR system data, and other aeronautical information for NAS users.

NAIMES consists of multiple closely integrated Ethernet-based Local Area Networks (LANs) (DMZs and intranets) within the ATCSCC and within the SLC remote site that are bridged together to form a heterogeneous network environment. NAIMES uses redundancy and server clusters at the primary site to improve availability, scalability, and optimize system performance. The NAIMES SLC remote site was developed to balance the server load and further optimize system availability and performance. The remote site also ensures continuity of critical core NAIMES services in the event of a catastrophic failure at the primary site. The primary and remote NAIMES system networks include production servers, web servers, and workstations running on both Sun Microsystems and personal computer (PC)-based platforms.

Most NAIMES components were developed by the FAA in cooperation with DoD using contract support from Electronic Data Systems (EDS), Optimal Solutions & Technologies (OST), and Northrop Grumman Information Technology (IT) (NGIT).

NAIMES users include:

- DoD (pilots, Military Base Operations (MBO) Specialists, and air traffic controllers)
- Pilots (commercial air carriers and general aviation)
- Air traffic controllers and specialists
- Other systems

- NOTAMs: USNS, DINS, AISR, NOTAM IP/NDS, NES, GTFR/SUA, NODA, AIDAP, ATCSCC Portal, PilotWeb, NAS Gateway, GPS, SF-21, FISDL, AMC Mobility 2000, Air Force Research Laboratory's (AFRL's) Rome Labs, National Aeronautics and Space Administration (NASA), Automated Surface Observing System (ASOS) Controller Equipment Information Display System (ACE/IDS), Systems Atlanta Information Display System 4 (SAIDS4), FCT Program, Weather Message Switching Center Replacement (WMSCR), Federal Emergency Management Agency (FEMA), National Geospatial-Intelligence Agency (NGA), United States Forestry Service (USFS), WAAS/GPS/Capstone, OASIS, ERIDS, and CARF
- NASR: USNS, AISR, NAS Gateway, Airlines, Airline Owners and Pilots Association (AOPA) Publications Division, FEMA, Jeppesen, National Aeronautical Charting Office (NACO), NASA, National Data Center, NAV CANADA, National Geodetic Survey (NGS), NGA, Obstruction Evaluation/Airport Airspace Analysis (OE/AAA), Department of Transportation (DOT) Volpe Center, HOST
- Flight Plans: AISR, NAS Gateway, A-TQS, HOST, ERAM, CARF
- Weather: AISR, ATCSCC Portal, NAS Gateway, PilotWeb, and AIDAP, airlines, and aeronautical service providers
- Graphical Data: NES, GTFR/SUA, DINS, ATCSCC Portal, NAS Gateway, PilotWeb, Capstone/WAAS, SF-21, FISDL, and U.S. Forestry Service
- Pilot Reports: AISR, NAS Gateway
- GPS: USNS, DINS, AISR, WAAS/GPS/Capstone, NAS Gateway, OASIS

Supporting agencies to NAIMES include:

- National Flight Data Center (NFDC)
- Automated Flight Service Stations (AFSSs)
- ARTCCs
- Regional Air Traffic Organizations
- DoD pilots, Radar Approach Control (RAPCON) facilities, and MBO Specialists
- AVN (Flight Check and TERPS specialists)
- International NOTAM Offices
- Flight Service Operations Support Center (FSOSC)
- Commercial providers of software, hardware, and telecommunications services
- FTI Program Office
- National Weather Service (NWS)
- Commercial weather providers (Weather Services International (WSI))
- Airways Facilities (AF) Technicians

# 2 REFERENCED DOCUMENTS

The policies and guidance NAIMES follows includes:

- Air Traffic Services (ATS) Concept of Operations for the National Airspace System in 2005, Narrative, FAA, September 30, 1997
- ATS Concept of Operations for the National Airspace System in 2005, Narrative, FAA, September 30, 1997

- Mission Needs Statement (MNS) #17, *National Aeronautical Information Service ( NAIS),* March 31, 2003
- FAA Order 1370.79A, *Internet Use Policy*, October 12, 1999
- FAA Order 1370.82, *Information System Security Program*, June 9, 2000
- FAA Order 1370.83, *Internet Access Points*, February 2001
- FAA Order 1370.84, *Internet Services Policy*, March 4, 2002
- FAA Order 1370.90, *Internet Access Point Configuration Management*, August 1, 2003
- FAA Order 1370.91, *Information System Security (ISS) Patch Management*, May 19, 2004
- FAA Order 1370.92, *Password and Personal Identification Number (PIN) Management*, June 28, 2004
- FAA Order 1600C, Personnel Security Policy, February 5, 1998
- FAA Order 7110.10, Flight Services
- FAA Order 7930.2J, *Notices to Airmen,* February 19, 2004
- Department of Transportation (DOT) Handbook 1350.2, *Departmental Information Resource Management Manual (DIRMM)*
- NAS-SR-1000, *National Airspace System, System Requirements (SR) Specification*
- FAA Order 1800.66, *Configuration Management Policy*
- FAA Order 1800.8f, *National Airspace Configuration Management*
- FAA Order 1800.57, *National Airspace Configuration Control Board*
- FAA Acquisition Management System
- Aeronautical Information Manual

# 3 CURRENT SYSTEM

NAIMES consists of a number of closely integrated NAS safety/mission critical systems and products that directly support the collection, validation, management, and dissemination of operational aeronautical information in the NAS. NAIMES provides users with real-time access to critical aeronautical data, essential for operations within the NAS. The NAIMES Program Office handles the entire system development lifecycle, from requirements definition through decommissioning. NAIMES is also a facilitator and enabler, providing value added products and services to support other NAS programs.

NAIMES consists of the following components:

- **US Notices to Airmen (NOTAM) System (USNS) (Joint FAA/ DoD)**
  - USNS Master Database

- NOTAM IP / NOTAM Distribution System (NDS)--NOTAM Data Distribution to Air Traffic Control Towers (ATCTs), Federal Contract Towers (FCTs), Terminal Radar Approach Control (TRACON) facilities, and Flight Service Stations (FSSs)
- NES (NOTAM Entry System)
- Graphical Temporary Flight Restrictions (GTFR)/ Special Use Airspace (SUA)
- Defense Internet NOTAM Service (DINS)
- National Operational Data Archive (NODA) & Database Master

- **NAS Fixed Asset Data**
  - NAS Resources (NASR) and eNASR (web-services version of NASR)
- **Data Access Portals (and associated services)**
  - Aeronautical Information System – Replacement (AISR) (Joint FAA/DoD)
  - ATCSCC Domestic Web System (Aeronautical Information Distribution/Portal)
  - PilotWeb (General Aviation (GA) Website)
  - Aeronautical Integrated Data Access Portal (AIDAP) (604 Circuit Replacement)
  - CDM
  - NAS Gateway
  - Extensible Markup Language (XML) Interfaces for Air Mobility Command (AMC), Military Operations (MILOPS), Operational and Sustainability Implementation System (OASIS), and En Route Information Display System (ERIDS)
- **Capstone/Wide Area Augmentation System (WAAS)/ Global Positioning System (GPS)**
  - Capstone/WAAS –en route and site-specific non-precision approach availability (Alaskan theater)
  - GPS Outages—satellite and site-specific non-precision approach availability (USNS and DINS)
- **Flight Information (Data Link)**
  - Safe Flight 21 (SF-21)
  - Flight Information Services (FIS) Data Link (FISDL)
- **DoD Specific Systems**
  - DINS
  - Central Altitude Reservation Function (CARF)
- **Other Flight Planning and Information Systems**
  - "Airline" Traffic Query System (A-TQS)—Enhanced Traffic Management System (ETMS)
  - FlightAssist (PC-based Flight Planning Application)

**Program and Infrastructure Services**

- NAS Qualified Internet Communication Provider (QICP) certified Internet Access Point (IAP)
- ISP for NAS Systems and facilities (ETMS, NAIMES, ATCSCC, etc.).
- SLC remote site
- NAS Network Information Center (NIC) (NAS FAA Internet Protocol (IP) Routed Multi-user Network (FIRMNet) and Future Telecommunications Infrastructure (FTI) IP address assignment)
- NAS Domain Naming Service (DNS)
- NAIMES Technical Support Help Desk

Figure 3 below shows the domains serviced by the NAIMES USNS.

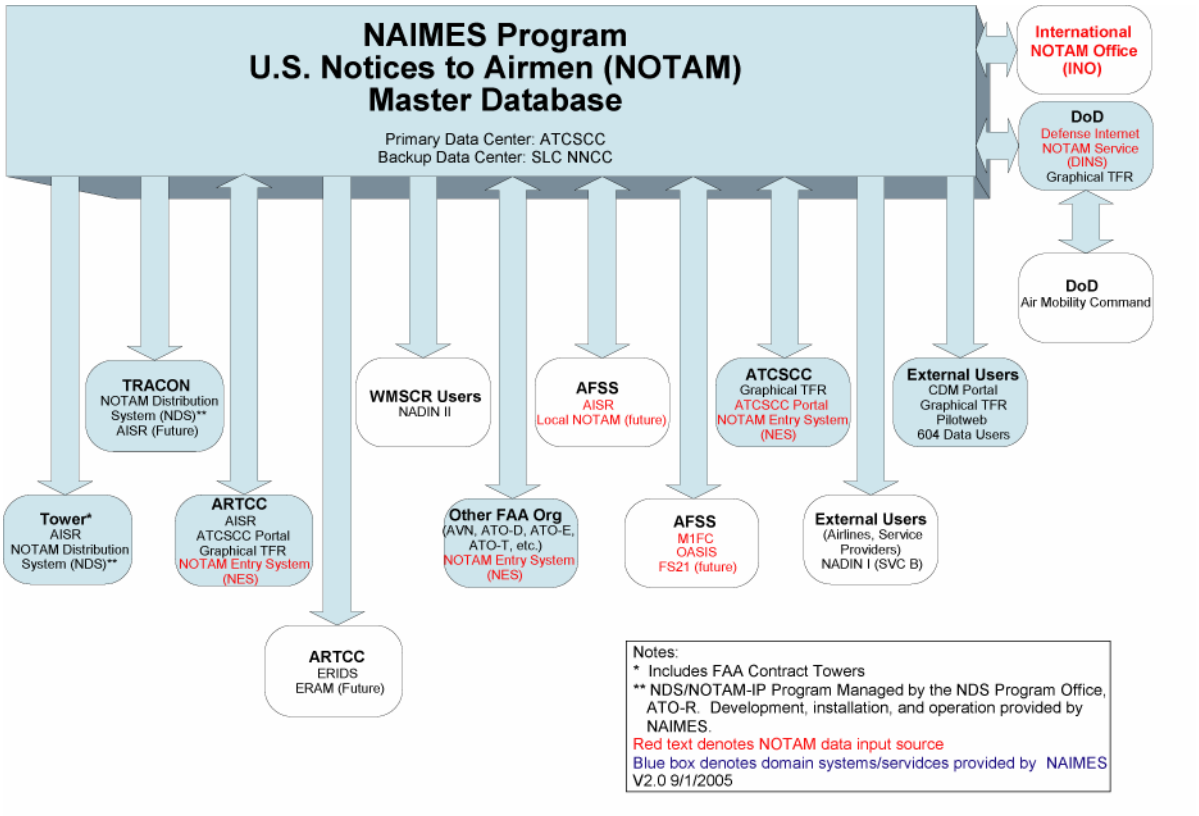


**Figure 3. NOTAMs Service Domains**

Figure 4 below shows the typical users of NAIMES services (top layer), the various NAIMES Services available (middle layer), and a sample of the available data sources (bottom layer).

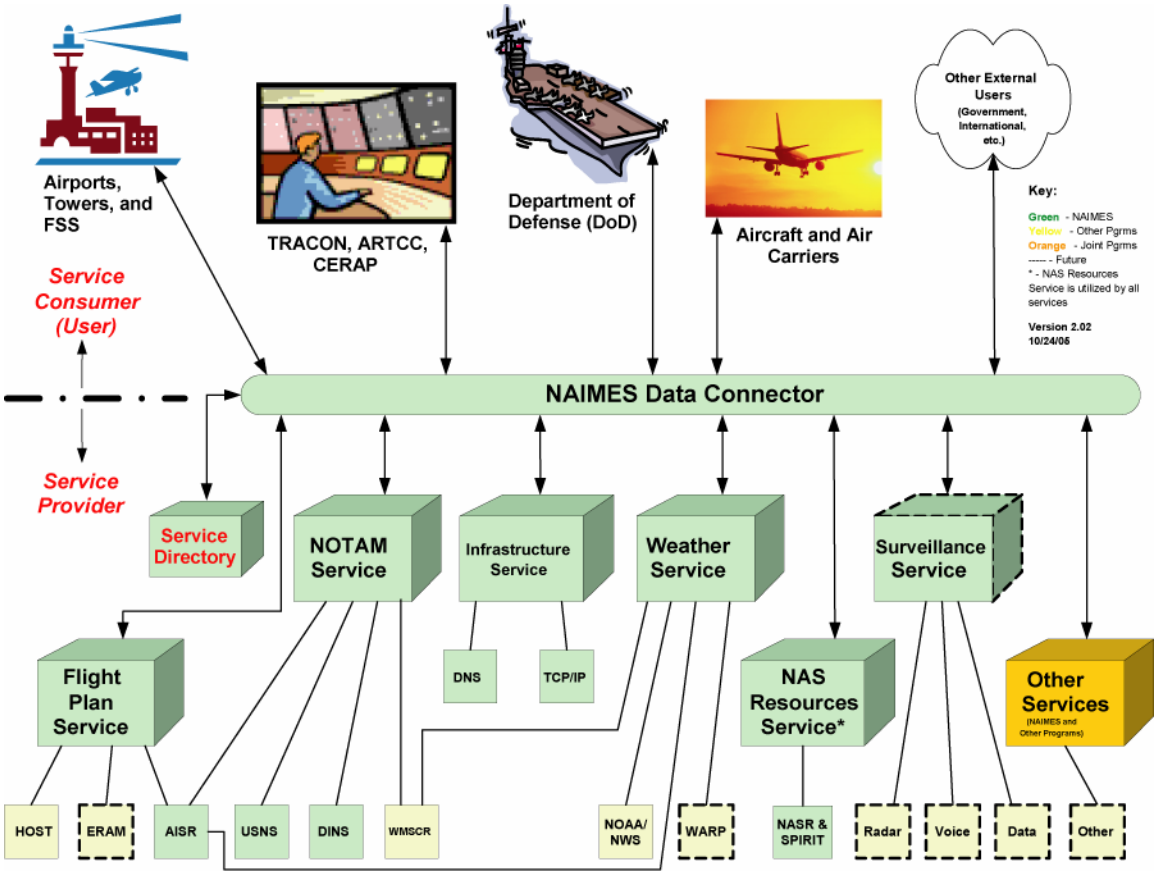


**Figure 4. NAIMES System Services and Users**

## 3.1 Background, Objectives, and Scope

This section provides an overview of the current system including the background, mission, objectives, and scope.

### 3.1.1 Background

Many of the existing NAS information systems were developed years ago using hardware, software, architecture frameworks, and information technologies that were considered state-of-the-art at the time. Over the years, a number of these legacy NAS systems have attempted modernization efforts however, the primary communication infrastructure supporting these legacy systems and their interfaces to other NAS information systems remained virtually unchanged even though more modern communications infrastructures and technologies were available. This resulted in a mix of old and new technology and a lack of system interoperability, data duplication over multiple systems, multiple entry points for the same information using manual processes, lack of timely distribution of data, and systems operating near or beyond capacity.

As the NAS transforms from point-to-point communication between systems into a more network-centric, data-driven environment, the value and dependency of data sharing has increased, along

with the volume of data exchanged. In 1992, the MNS # 17, Operational Data Management System (ODMS) was approved and subsequently endorsed in 1994 and 1999. The MNS identified capability shortfalls in four critical areas:

- National Airspace System Resources (NASR)
- Obstruction Evaluation / Airport and Airspace Analysis (OE/AAA)
- National Operational Data Archive (NODA)
- United States NOTAM System (USNS)

The NAIMES program was established to meet portions of MNS #17 and ensure quality, integrity, consistency, and availability of aeronautical information among all NAS air traffic control and user-based systems. In 2002, Air Traffic System Requirements Service (ARS) determined the MNS required revalidation to ensure evolving mission needs were captured. This MNS was revalidated on March 31, 2003 as the NAIS MNS.

The NAIMES program uses the spiral development methodology as shown in Figure 5 to develop and field capabilities. Its Quality Management System maintains a tight feedback loop with its customers and stakeholders to ensure their requirements are known and then develops and/or acquires capabilities to meet the customer's specific needs. By using with this approach, NAIMES can incrementally incorporate new technologies into its systems, rather than delivering monolithic solutions using only those technologies that existed when the systems were initially designed. Spiral development increases flexibility and efficiency, streamlines the development cycle, and delivers the capability much faster. This approach also significantly lowers the cost of fielding the desired capability.

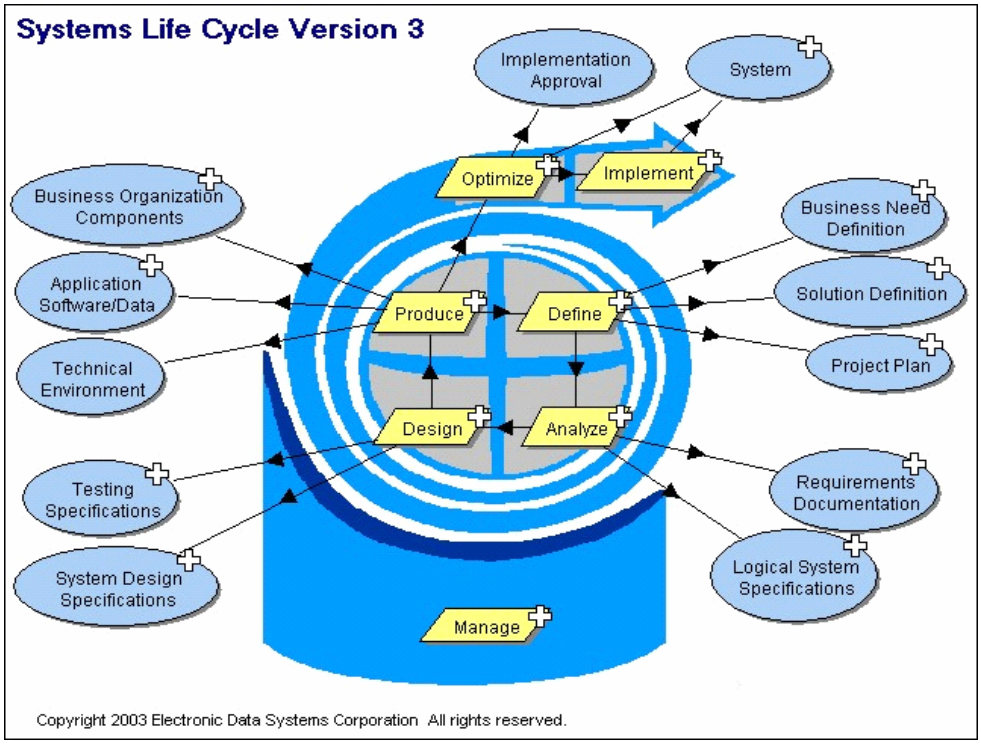


**Figure 5. Spiral Development Methodology**

NAIMES provides timely, cost-effective aeronautical information and services using the best IT management practices. NAIMES uses a modular, scaleable design with modern communications, computers, software, and networking and data protocols to provide affordable, efficient services. NAIMES is based upon a non-proprietary, open architecture approach using the latest Internet protocols and Commercial-off-the-shelf (COTS) technologies and tailors services to meet user's needs. NAIMES is also flexible enough to address gaps and seams in interoperability between new systems using modern communications and protocols and older systems still using legacy protocols and communications. NAIMES provides dynamic and responsive data and services to NAS users.

NAIMES provides direct user interfaces and system-to-system interfaces to NAS users. The direct user interfaces are through web pages, Java applications, and custom built graphical user interfaces. The system to system interfaces include custom built interfaces and web services (including XML interfaces and service-oriented architecture protocol (SOAP).

A service-oriented architecture is essentially a collection of automated services. These services communicate with each other via web services where the web services are built on top of well-known and platform-independent protocols such as HTTP, XML, Universal Description, Discovery, and Integration (UDDI), Web Services Description Language (WSDL), and SOAP. The communication may involve either simple data passing or it could involve two or more services coordinating some activity to provide a value-added product.

A service is a function that is well-defined, self-contained, and does not depend on the context or state of other services. A service is also the endpoint of a connection that has some type of underlying automation supporting the connection offered. Services are what you connect together using Web Services.

"Web Services" has a different meaning than the generic term "services." The term Web Services refers to the technologies that allow for making connections. This combination of services, both internal and external to an organization, makes up a service-oriented architecture.

Figure 6 illustrates the basic service-oriented architecture as implemented in NAIMES. It shows a service consumer at the lower right sending a service request message (4) to a service provider at the lower left. The service provider returns a response message (5) to the service consumer.

WSDL forms the basis for Web Services.

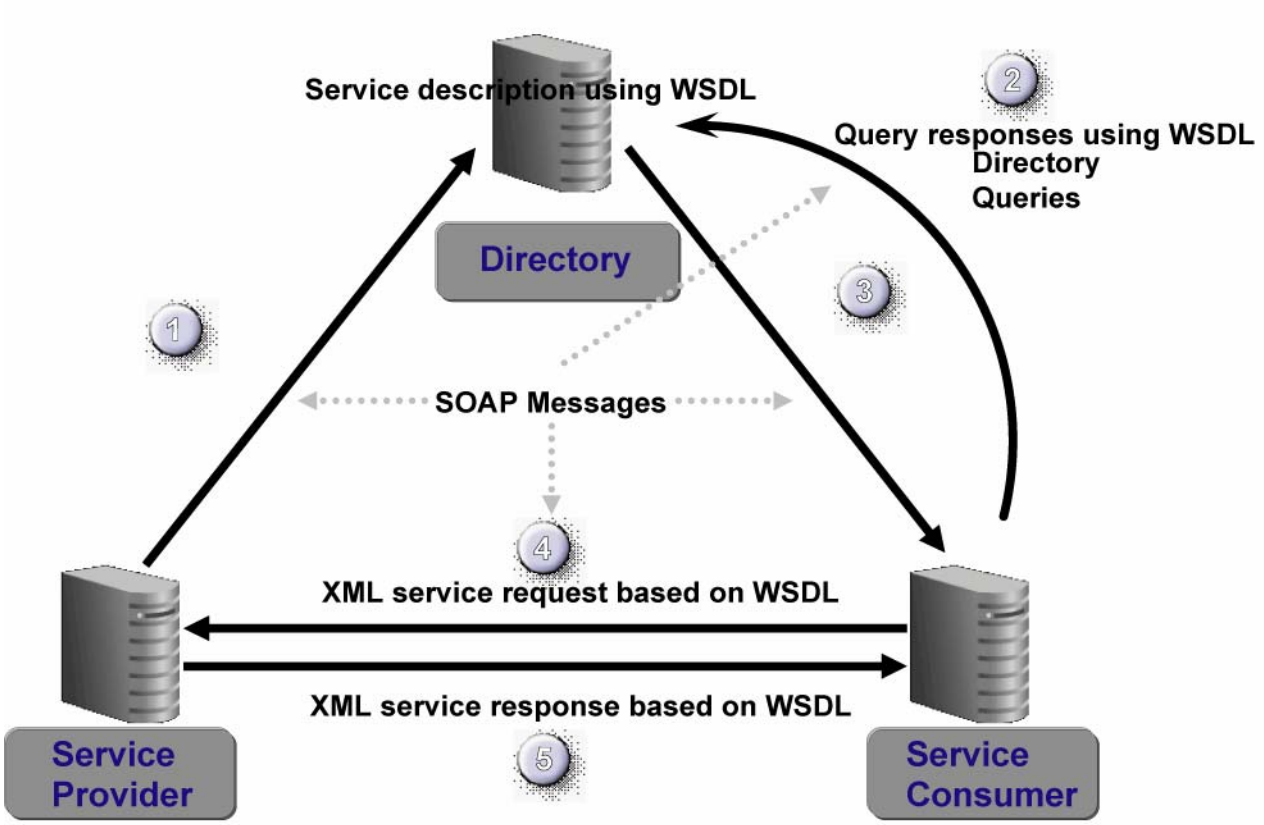


**Figure 6. Service Oriented Architecture**

### 3.1.2 NAIMES Mission Statement

**Provide quality aeronautical information services to support the FAA Mission.**

### 3.1.3 NAIMES Vision Statement

**Continuously improve the safety and efficiency of the NAS as the premier provider of on-demand operational aeronautical information and services to our customers and stakeholders worldwide.**

### 3.1.4 Objectives

The NAIMES objectives are to:

- Eliminate correlation between paper products and electronically transmitted data by digitizing and storing all aeronautical information in databases
- Continuously improve ability to provide timely, accurate, high-quality safety of flight aeronautical information for its customers

- Continuously improve interoperability and integration with other NAS and external information systems to minimize duplication and discrepancies
- Implement streamlined business processes, with minimal manual entry and manipulation of data
- Provide the ability to relate data between subsystems using NASR as the metadata standard
- Provide access to relevant information that is adaptable to the specific needs of authorized users
- Field systems that are flexible and expandable to accommodate technology changes
- Minimize data latency, duplication, and discrepancies
- Continuously improve the capability to automatically and accurately collect, validate, process, store, retrieve, maintain, analyze, and disseminate NAS aeronautical data (both static and operational) with minimal human intervention
- Ensure access to the most current data to expedite traffic flow and to maximize operational system capacity
- Provide support for data transfer in accordance with ICAO standards
- Maintain a 99.975% NAS system availability
- Resolving problem reports in a timely manner by resolving 95% of Problem Report (PR) Tracker tickets within the commit date

### 3.1.5 Scope

NAIMES products and services have worldwide scope.

## 3.2 Operational Policies and Constraints

This section describes operational policies and constraints that apply to the NAIMES. Policies limit decision-making freedom but do allow for some discretion. Operational constraints are limitations placed on the operations of the current system.

| Organization or System | Hours of Operation | Constraint |
|---|---|---|
| Model 1 Full Capacity (M1FC), Aviation Weather Processor (AWP), Flight Service Data Processing System (FSDPS) | 24 x 7 x 365 | System capacity limitations prevent national distribution of Local (L) NOTAMs<br>For M1FC-equipped AFSSs, L NOTAMs are collected at the FSDPS and are available to the M1FC AFSSs within the FSDPS family of Flight Service Stations<br>For OASIS-equipped AFSSs, L NOTAMs are not forwarded outside of the AFSS<br>NOTE: These are not NAIMES |

| | | |
|---|---|---|
| | | limitations but constraints imposed on NAIMES. NAIMES has the capacity and is ready to include L NOTAMs in the USNS Master Database. NAIMES is working to include L NOTAMs in USNS. |
| ATCTs, FCTs, TRACONs | Varies—some are 24 x 7 x 365 and others have limited hours | Lack of FTI-based distribution and display systems<br>NOTE: These are not NAIMES limitations but constraints imposed on NAIMES. FTI implementation will overcome this limitation. |
| AFSSs | 24 x 7 x 365 | Legacy M1FC-based systems retrieve NOTAM and weather data using M1FC from WMSCR via NADIN.<br>M1FC has a capacity limitation of identifiers per state and number of pages of data it can display. These can be fixed by increasing the limitations however, it OASIS does not have that limitation since it can receive data direct from USNS.<br>NOTE: These are not NAIMES limitations but constraints imposed on NAIMES. |

## 3.3 Description of the Current System

NAIMES consists of multiple closely integrated Ethernet-based Local Area Networks (LANs) (DMZs and intranets) within the ATCSCC and within the SLC remote site that are bridged together to form a heterogeneous network environment. NAIMES uses redundancy and server clusters at the primary site to improve availability, scalability, and optimize system performance. The NAIMES SLC remote site was developed to balance the server load and further optimize system availability and performance. The remote site also ensures continuity of critical core NAIMES services in the event of a catastrophic failure at the primary site. The primary and remote NAIMES system networks include production servers, web servers, and workstations running on both Sun Microsystems and personal computer (PC)-based platforms.

The NAIMES network architecture is logically divided into four network subsystems at both the primary and remote site to enhance security and improve system availability. The four networks subsystems are the NAIMES Master subsystem, the FIRMNet Subsystem, the NIPRNET Subsystem, and the Internet Subsystem. Each NAIMES subsystem provides products and services to different domains and contains its own separate DMZ. NAIMES implements the security processes recommended by ATO security and the FAA CIO and is in accordance with the NAS Architecture Version 5.

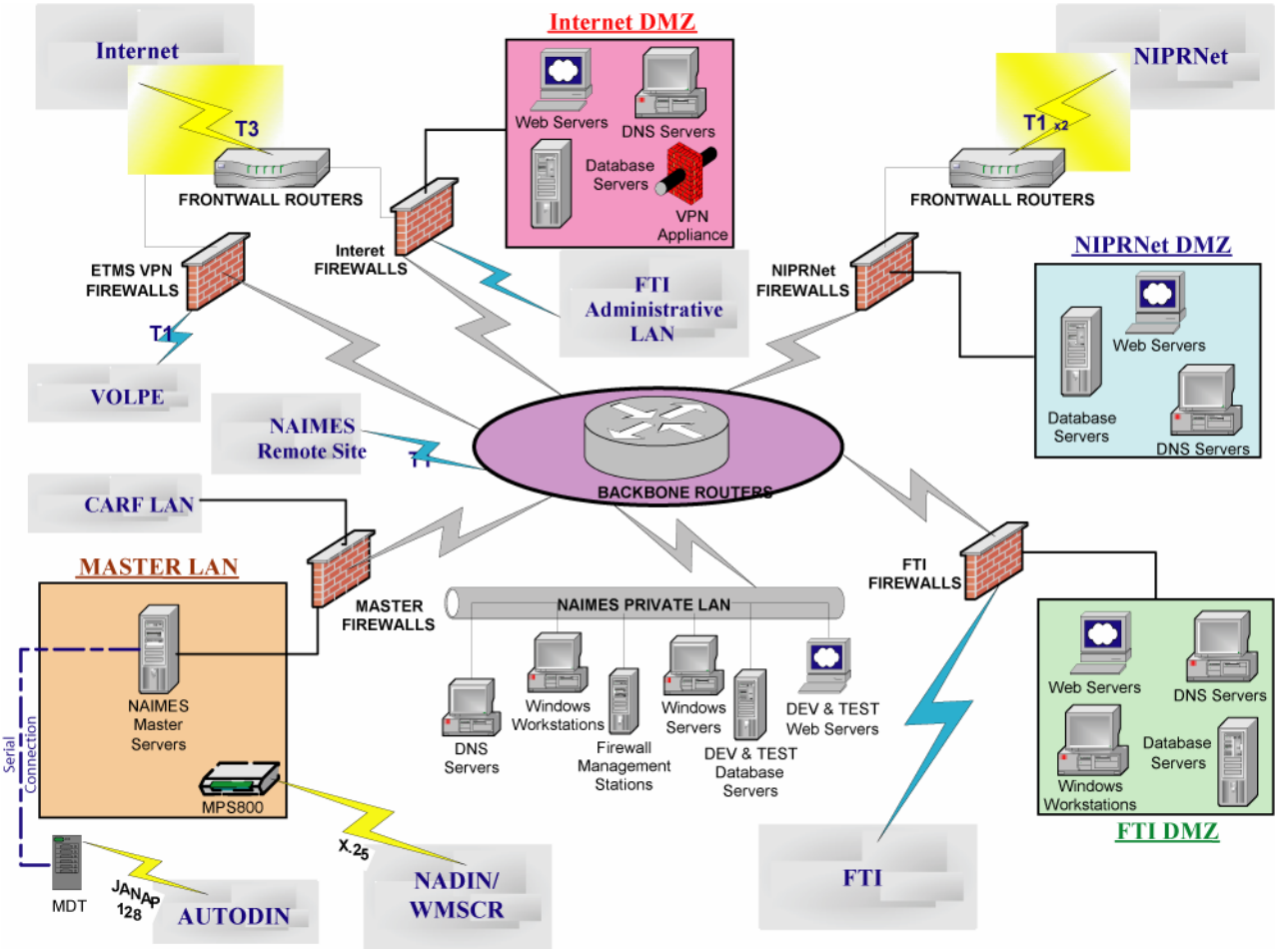


**Figure 7. NAIMES Primary Site**

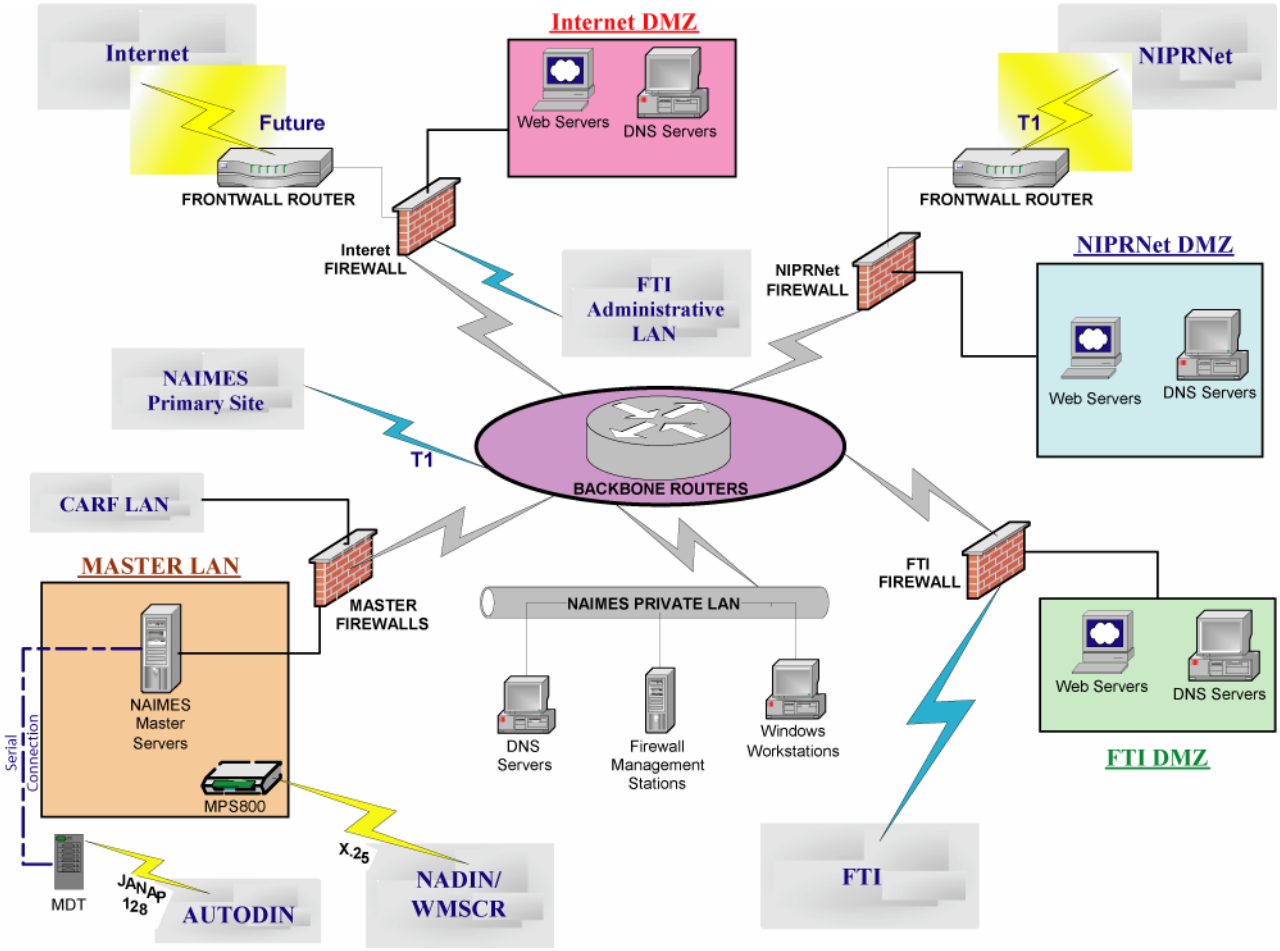


**Figure 8. NAIMES Remote Site**

NAIMES collects/processes NOTAM messages and aeronautical information from the NADIN X.25 PSN, the DoD AUTODIN, FTI Administrative Network, DoD NIPRNET, and Internet sources. NAIMES also collects, processes, and distributes flight plans, weather data, GPS/WAAS outage data, and surveillance data. NAIMES provides aeronautical information portal capabilities and data distribution to various locations, systems, and networks. As new NAS systems are established or as existing NAS systems are modernized, these systems will be able to access aeronautical information directly from the NAIMES portal via standard interfaces without relying on copies of data stored and/or recreated on other NAS systems.

The NAIMES system supports a wide and diverse range of users with unique operational roles and needs. These users range from the military (pilots, command and control, base operations specialists), commercial air carriers, air taxis/commuters, to general aviation, and are supported by a variety of Air Traffic Controllers, AFSS Specialists, and FCT controllers. NAIMES provides guaranteed NOTAM data delivery to FCTs, ATCTs, TRACON facilities, ARTCC facilities, AFSSs, and the ATCSCC.

Users may obtain NAIMES data in various ways. NAIMES provides web page access (AISR, ATCSCC Web, CARF, CDM, DINS, NODA, NOTAM IP, WAAS, NES, General Aviation, and MILOPS) and customized Java client application (NDS) to allow direct access to aeronautical information. NAIMES also provides interfaces to systems using SOAP (DINS and AISR), XML

services (OASIS, AMC, and AIDAP), and interfaces using standard data formats and TCP/IP or X.25 protocols (NADIN I, NADIN II, WMSCR, OASIS, Host (indirect), and M1FC (indirect)). Most NAIMES services are currently provided over FTI/FIRMNet, the Internet and NIPRNET however support is also provided for systems requiring X.25 protocols.

NAIMES interfaces and services are designed to be both flexible and scaleable in order to meet the current and future needs of our customers.

NAIMES data is mission essential/safety critical for the FAA and mission critical for the DoD. NAIMES services are categorized as mission essential according to the National Airspace System Requirements Specification (NAS-SR-1000). The loss of NAIMES services to the NAS would reduce the capability of the NAS to exercise safe separation and control over aircraft. Within NAS-SR-1000, the NAS Service Functional Categories NAIMES provide and/or supports include Aeronautical Information (USNS (NOTAM) and NASR), Flight Plan Submission and Evaluation (AISR), En Route Navigation (Capstone/WAAS/GPS), Terminal Navigation (Captsone/WASS/GPS), and Support of Military Operations (USNS AISR, NES, DINS). As an essential service, NAIMES requires a 99.9% system availability; no single failure of equipment, system, installation, or facility shall cause a loss of service to the user/specialist; the goal for a single loss of service to a use/specialists shall not exceed 10 minutes in duration; and the frequency of occurrence goal for any loss of service shall not exceed once per week.

NAIMES aeronautical information includes the following data types:

- NASR: NASR includes fixed aeronautical reference information (runways, Navigational Aids (NAVAIDs), Location Identifiers, etc.) typically found in aeronautical charts and publications
- NOTAMs: Messages that provide timely information on the establishment, condition, or change in any aeronautical facility, service, procedure, or hazard that is essential to personnel concerned with flight operations
- Flight Plans: Specified information relating to the intended path of an aircraft
- Weather: Graphical and alphanumeric observations and forecasts
- Pilot Reports: A report of in-flight weather by an aircraft pilot or crew member
- GPS/WAAS: Global Positioning System Wide Area Augmentation System outage data
- Surveillance: Radar and voice data

The following information shows the usage of NAIMES aeronautical information (valid for July 2005):

- AISR – 19,808,460 hits
- PilotWeb – 30,626,735 hits
- All Other Web Sites – 4,116,699 hits
- AMC XML Aeronautical data transfers 80 gigabytes (GB) per month

### 3.3.1 United States NOTAM System (USNS)

USNS is a joint FAA/DoD safety-critical system for collecting, processing, maintaining, and distributing NOTAMs for the U.S. civilian and military aviation communities. The USNS consists

of the USNS Master Database (formerly the Consolidated NOTAM System (CNS)) and the USNOF, which includes the FAA NOTAM Specialists and military NOTAM coordinators. The USNS began operation in 1985 at the FAA's National Communications Center (NATCOM) in Kansas City, MO. It was migrated to Plano, TX in 1993, and subsequently re-hosted at the ATCSCC in Herndon, VA in 1998. The USNS backup system is located at the SLC NNCC.

A NOTAM provides information on temporary and/or immediate changes to the condition of any aeronautical facility, service, procedure, or component (e.g. runways, navigational aids, lighting) involved in flight operations. A NOTAM is originated when any authorized aviation specialist in the world recognizes an event or condition that creates an unsafe flying condition. NOTAM originators include but are not limited to: FAA FSS/AFSS specialists, DoD MBO personnel, FAA and DoD Terminal Instrument Procedures specialists (TERPS), Traffic Management (TM) specialists, and CARF specialists, US Department of the Interior (DOI), DoD's Joint Chiefs of Staff, and FAA International Affairs personnel. Once an unsafe condition is identified anywhere in the world, the process of getting the information into the "NOTAM System" is dependent upon who has both the physical access and logical authority to enter data into the USNS Master Database.

There are a number of different types of NOTAMs and they differ in format, purpose/criteria, and distribution. The format and purpose/criteria for NOTAMS is in FAA Order 7930.2, *Notices to Airmen*. The common types of NOTAM messages are:

- Domestic (D) – A NOTAM that meets D NOTAM criteria as defined in FAA Order 7930.2. D NOTAMs are usually issued for safety related conditions at a specific location
- Flight Data Center (FDC) – mostly procedural NOTAM messages entered through the FDC office
    - Temporary Flight Restriction (TFR) – a type of FDC NOTAM
    - Presidential/Security – a type of FDC/TFR NOTAM
- Local (L) - A NOTAM that meets L NOTAM criteria defined in FAA Order 7930.2
- Military – NOTAM messages issued by U.S. Department of Defense personnel
- ICAO – Internationally exchanged NOTAMs

In addition to NOTAM information originated in the United States, international NOTAMs are also gathered, stored, and disseminated by the US NOTAM Office (USNOF). NOTAM information is freely shared between almost every civil and military organization in the world. This is part of the global sharing of data between sovereign nations' NOTAM systems to support international aviation safety. NAIMES also maintains log files of NOTAM distribution and receipt acknowledgement for systems and users that obtain NOTAM data directly from USNS and the NOTAM-IP/NDS.

NOTAM recipients include:

- FSSs and AFSSs—for eventual dissemination by the specialists to pilots, by telephone or face-to-face briefings
- ARTCCs—for dissemination to air traffic controllers and pilots
- ATCSCC—for dissemination to air traffic controllers, airlines, and other authorized recipients

- TRACONs—for dissemination to air traffic controllers and pilots
- ATCTs—for dissemination to air traffic controllers, traffic managers and pilots
- Civilian operators—for use in planning flight movements
- Military offices—for dissemination to military pilots and flight crews
- International users—for dissemination to international pilots
- Direct Users Access Terminal System (DUATS)—for dissemination to general aviation pilots

NOTAM data flow is relatively simple from a high-level perspective but becomes complex when all of the underlying entry and processing systems, networks, policies, protocols, procedures are taken into account. From a high-level perspective, NOTAM flow includes:

- Origination of candidate NOTAMs
- Transmission of candidate NOTAMs
- Receipt of candidate NOTAMs or International NOTAMs at USNS
- Validation of NOTAMs
- Storage of validated NOTAMs
- Dissemination of NOTAMs

For D NOTAMs, NAS facilities identify changes to published aeronautical information or unpublished unsafe conditions and either fax or telephonically relay the information to FSS specialists who enters the candidate NOTAM message into the NOTAM system. The process is similar for the ARTCCs and other agencies that create procedural FDC NOTAMs. These organizations fax, telephone, mail, or send via the web candidate NOTAM information to the U.S. USNOF, where the NOTAM Specialists, after a review to ensure the quality and the accuracy of the NOTAM information, enter the data into the USNS Master Database. Flight Data Specialists located at AFSSs enter NOTAMs using M1FC terminals that are connected to the FSDPS associated with their facility. The FSDPS transmits messages to the NOTAM Master Database via the NADIN IA circuit. At an OASIS location, NOTAMs are transmitted directly over NADIN I Wide Area Network to the USNS. FSS specialists can also enter NOTAMs via workstations connected to AISR.

International NOTAMs are sent to/received from the USNS Master Database via the legacy FAA NADIN I and the Aeronautical Fixed Telecommunications Network (AFTN) circuits.
The USNS Master Database processes military NOTAMs originating through AUTODIN, and NIPRNET networks.

The USNS Master Database distributes NOTAM products over the NADIN Message Switched Network (MSN), FTI/FIRMNet, the NIPRNET, and the Internet to FAA, military, and commercial customers. Domestic and FDC NOTAMs are distributed to WMSCR via the NADIN PSN. The WMSCR performs further distribution of NOTAMs to other systems that, in turn, store and forward to end users. The USNS also processes NOTAM queries from any NADIN MSN user.

The USNS database uses the Oracle RDBMS and runs on Sun platforms using standard open system interfaces.

To enhance distribution of NOTAM data, the NAIMES program developed an XML NOTAM interface. This interface provides NAS systems with access to an Oracle relational database containing all D and FDC NOTAMs within USNS, which can be accessed by external servers using secure sockets and an XML query. This server-to-server capability significantly improves the distribution of operational aeronautical information within the NAS and the aviation community.

Currently, L NOTAMs are not transmitted to USNS by OASIS or by FSDPS for M1FC AFSS facilities. NAIMES is currently working with the FS-21 Program to include L NOTAMs in the Master Database.

Figure 9 below shows the flow of NOTAMS in the USNS.

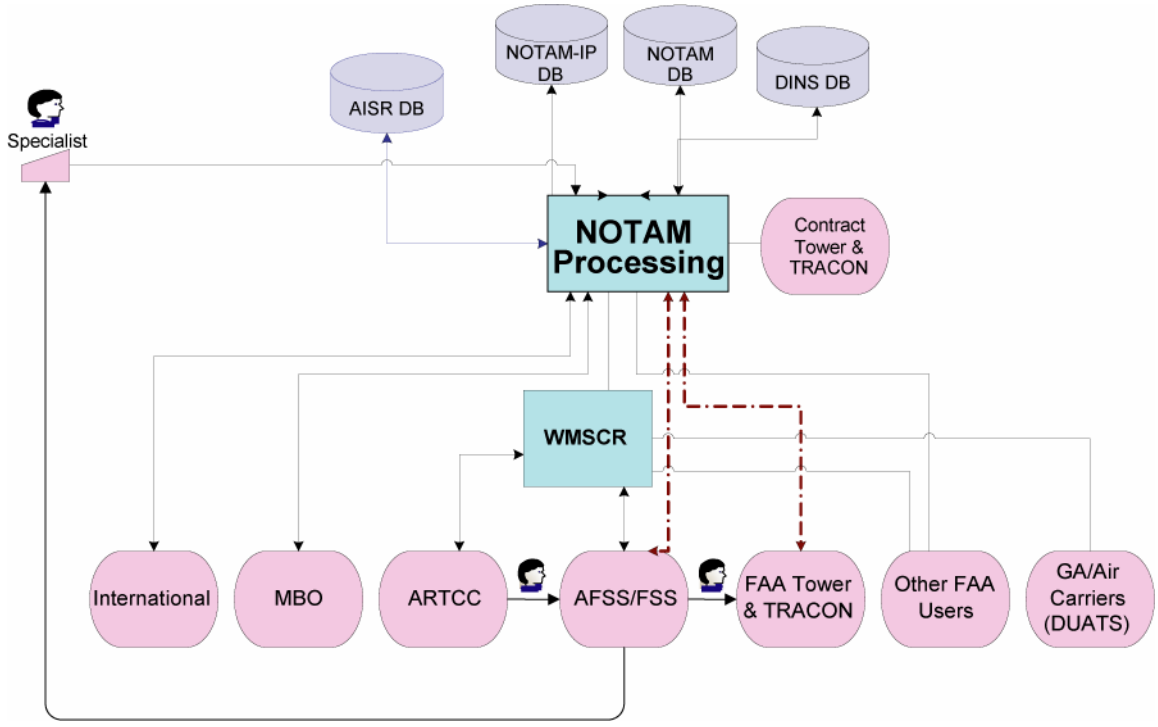


**Figure 9. USNS Processing**

### 3.3.1.1 NOTAM-IP /NDS Distribution

NOTAM IP / NOTAM Distribution System (NDS) disseminates NOTAMs directly to ATCTs, FCTs, TRACON facilities, and AFSSs using modern communications systems and technologies and bypassing legacy distribution systems and technologies. Phase 1 utilizes an internal web site specifically designed for ATCT, TRACON, and AFSS customers where users periodically connect via the FTI Administrative Network and download (pull) NOTAM messages using a web browser.

Figure 10 shows the NOTAM-IP Web System.

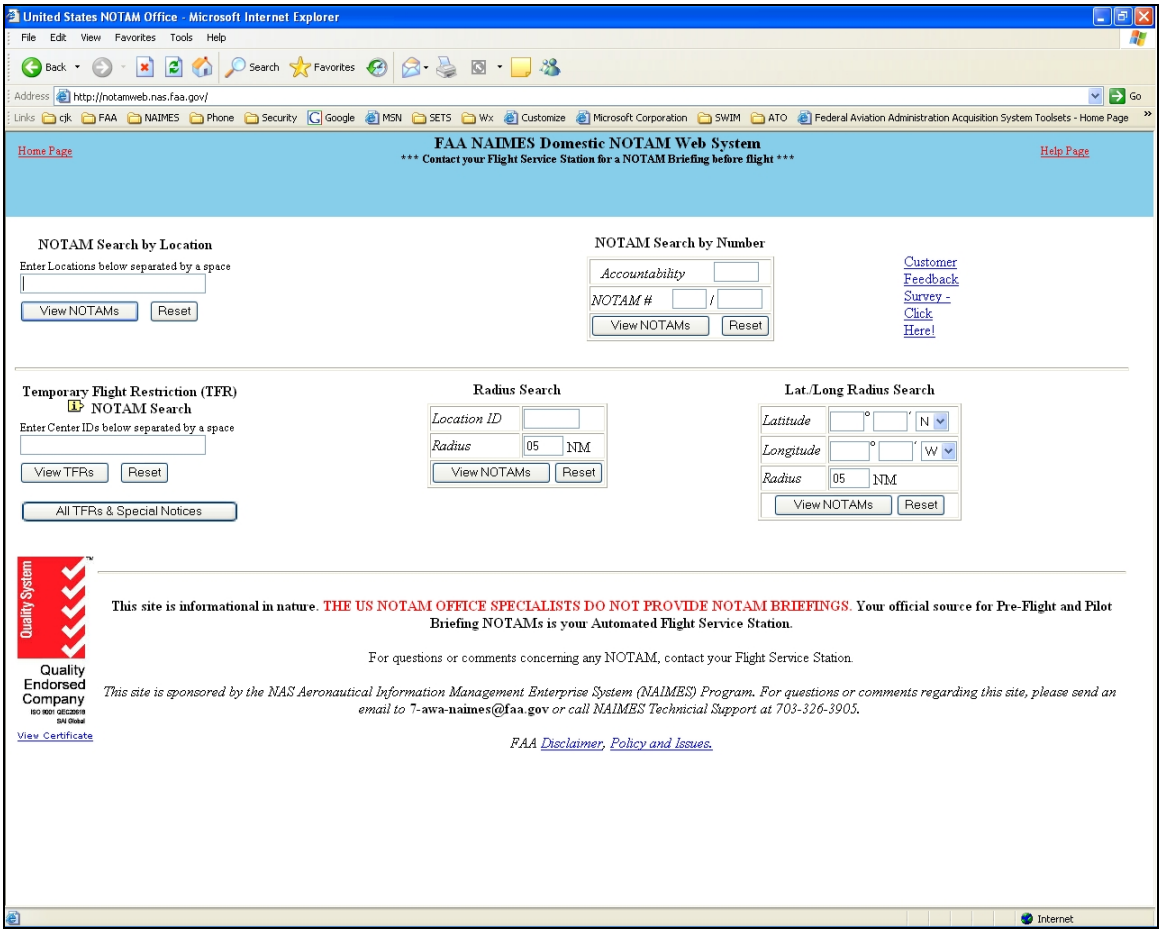


**Figure 10. NOTAM-IP Web System**

Phase 2 utilizes a Java-based client/server application that provides real-time push and notification of new NOTAMs over FTI and a local database of site-specific NOTAMs. The Java-based client also sends positive NOTAM receipt acknowledgement back to the NDS server at the ATCSCC.

NAIMES is managing NDS to support ATO-R's NOTAM distribution requirement (2000 ADA-1 Memo).

#### 3.3.1.2 FAA NOTAM Entry System (NES)

The NOTAM Entry System (NES) is a web-based system that allows authorized users to enter draft (also known as raw or candidate) NOTAMs with a web browser. NES allows the users to bypass legacy technologies and systems that were used to enter and transmit NOTAMs. NES allows the NOTAM specialists at the USNOF to approve the draft NOTAMs before submitting them into USNS. NES is currently being used to enter FDC, TFR, and Center NOTAMs. NES also allows users to view GTFRs and SUA information.

FDC NOTAMs refer to information that is regulatory in nature including the following:

- Interim Instrument Flight Rule (IFR) flight procedures:
  - Airway structure changes
  - Instrument approach procedure changes
  - Airspace changes in general
- Temporary flight restrictions:
  - Disaster areas
  - Special events generating a high degree of interest
  - Hijacking
- Flight restrictions in the proximity of the President and other parties
- 14 Code of Federal Regulations (CFR) Part 139-certificated airport condition changes
- Snow conditions affecting glide slope operation
- Air defense emergencies
- Emergency flight rules
- Substitute airway routes
- Special data
- U.S. Government charting corrections
- Laser activity

ARTCCs and FSS send their NOTAMS using existing entry methods (WMSCR, OASIS, and AISR). AVN sends new NOTAMs to the USNOF via fax, telephone, or mail. The use of legacy systems was slow, labor intensive, and prone to error.

The FDC NES is a web-enabled online application based on technology developed by the FAA for the highly successful DoD DINS System. Its workflow process allows authorized AVN users to enter draft FDC NOTAMs and allows NOTAM specialists at the USNOF to approve these drafts before submitting them into USNS.

The web server uses Secure Sockets Layer (SSL) encryption to secure the connection. The system includes the following features:

- User Registration
- Template Management
- Draft Management
- Draft NOTAM
- Approve NOTAM
- Scheduler

- Tech Support Utilities

Figure 11 shows the initial help/login page.

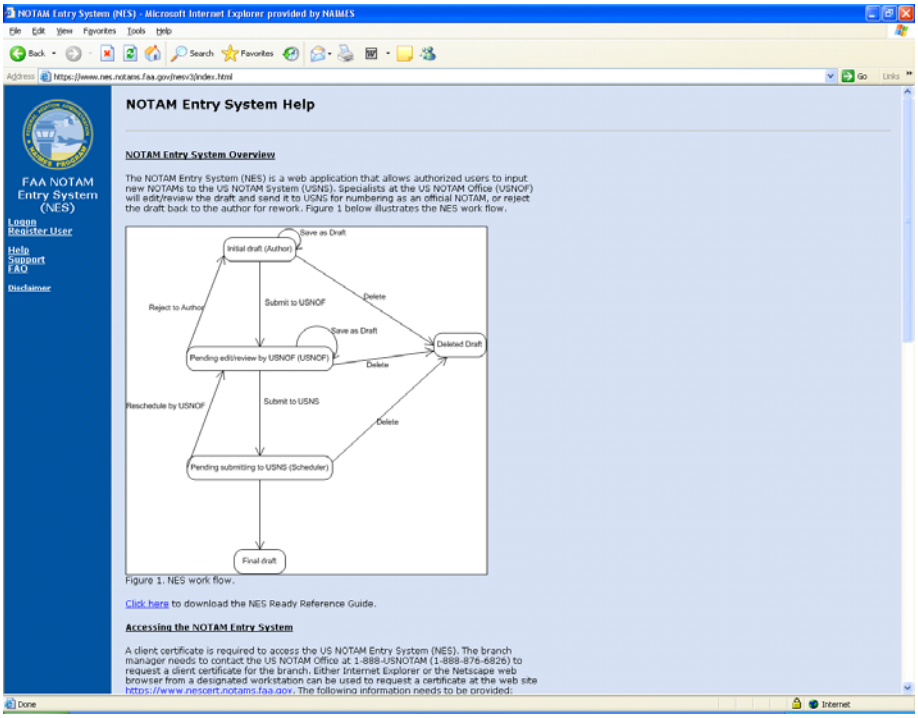


**Figure 11. FAA FDC NOTAM Entry System Help/Login Page**

### 3.3.1.3 GTFR/ SUA

NAIMES has developed a graphical web-based product which provides visual representations of relevant TFR and SUA advisory information for controllers and pilots. This system automatically displays a TFR on a current sectional or IFR chart. This tool will continue to be enhanced to provide users with a configurable real-time product that displays the status of the NAS utilizing data from a wide variety of Air Traffic systems.

Figure 12 shows a sample GTFR display on a sectional map.

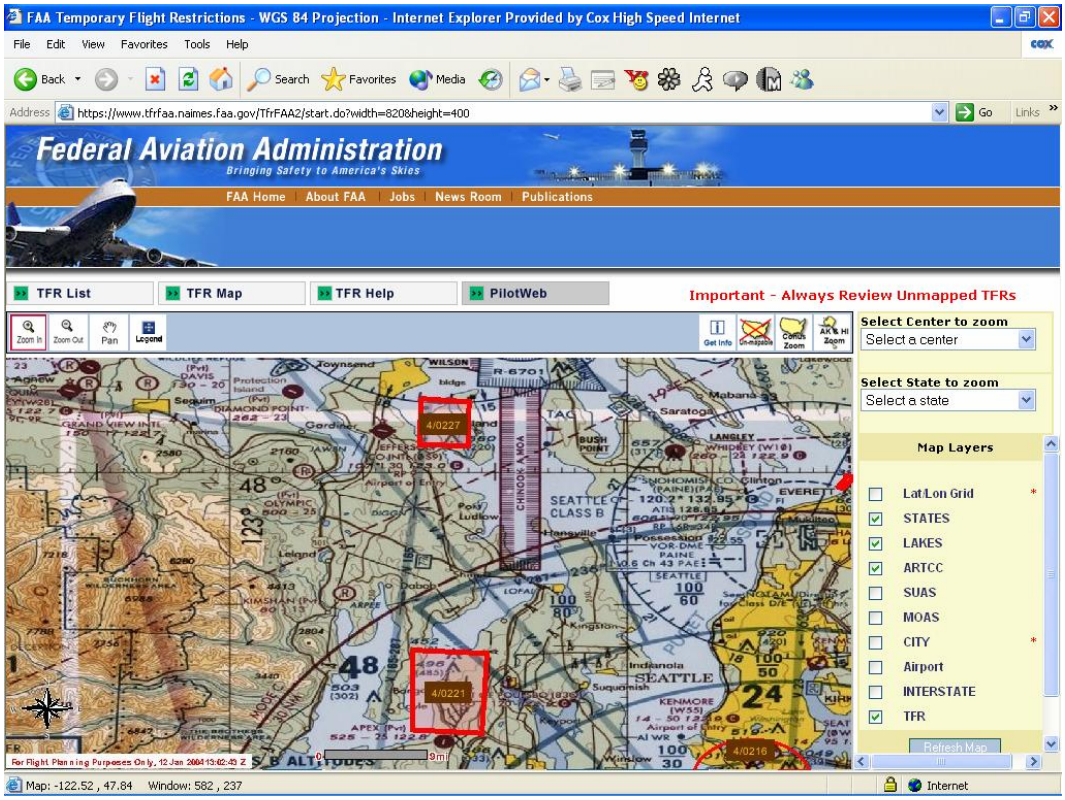


**Figure 12. Sample Graphical Temporary Flight Restriction (GTFR) Display**

Figure 13 shows a sample high-level display showing both GTFRs and SUA.

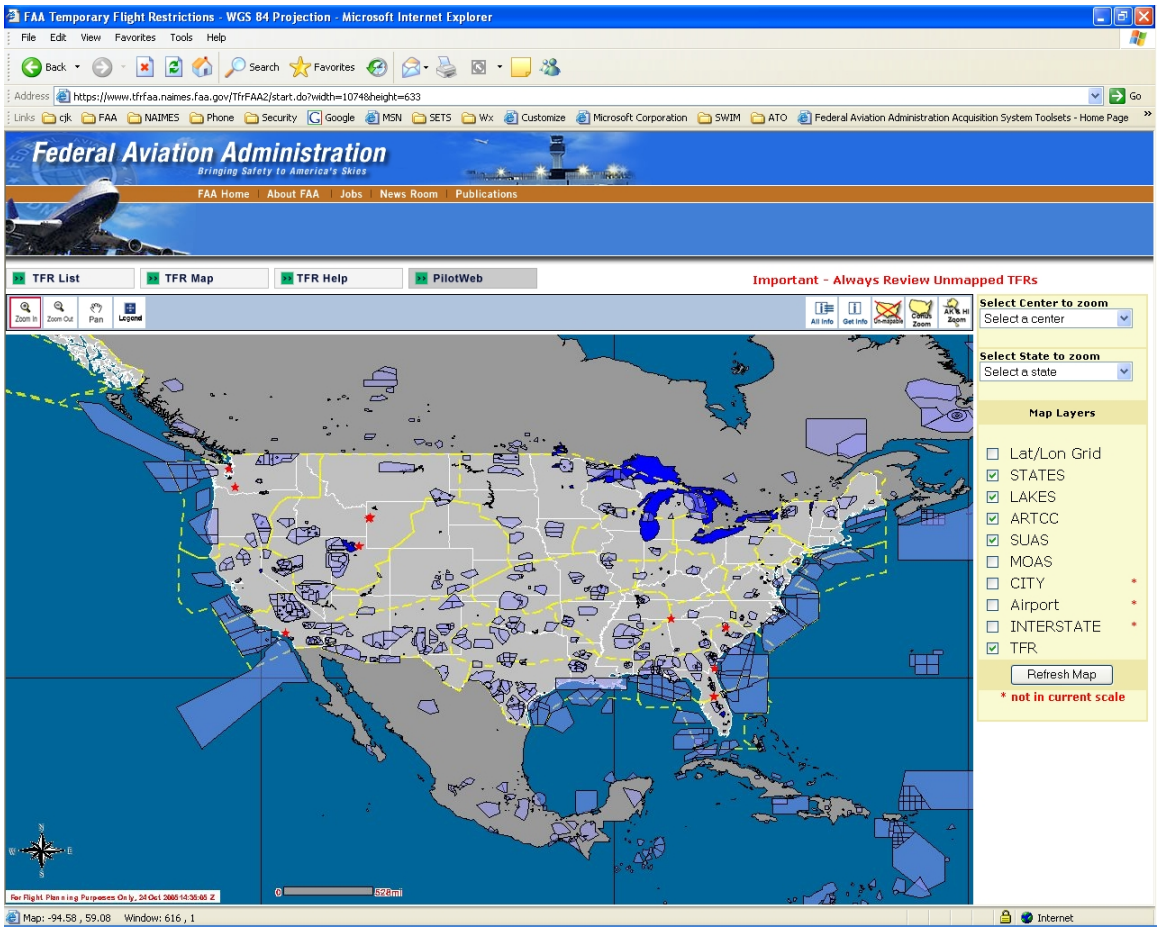


**Figure 13. Sample High-Level GTFR and SUA Display**

### 3.3.1.4 Defense Internet NOTAM Service (DINS)

The Defense Internet NOTAM Service (DINS) is a joint FAA/DoD Mission-Critical enhancement to USNS designed to provide NOTAM products in a near real-time manner to military pilots and flight crews using modern telecommunications infrastructures. DINS interfaces with the USNS and the DINS database is replicated in near-real time from USNS. The user interface for DINS is implemented as web pages for NOTAM retrieval and entry. The Secure Sockets Layer (SSL) over the hypertext telecommunications protocol (HTTP) is used to provide a secure hypertext transfer protocol (HTTPS) via the military's NIPRNET or the Internet to the DINS server. Authorized military personnel use DINS to create, cancel, and replace NOTAMs. NAIMES manages the DINS system for the DoD as part of the FAA/DoD Executive Level Agreement.

The DINS system was designed to support future migration to an ICAO-compliant system by storing all NOTAMs in its database in the ICAO standard NOTAM format. To improve human readability of the ICAO format, DINS displays NOTAMs in plain language by expanding duration dates and Q-codes. Communication support for commercial Internet circuits was added to improve information availability.

Figure 14 shows the main DINS Query Page.

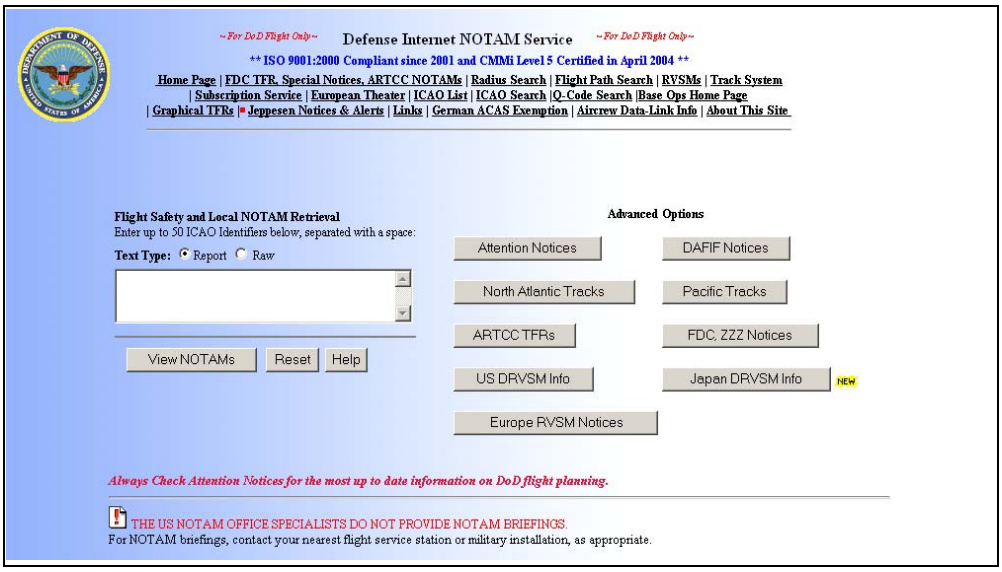


**Figure 14. DINS Query Page**

NOTAM query's are entered and displayed in ICAO format. Figure 15 shows a sample query page for KDCA (DCA) Ronald Regan National Airport in Washington, DC.

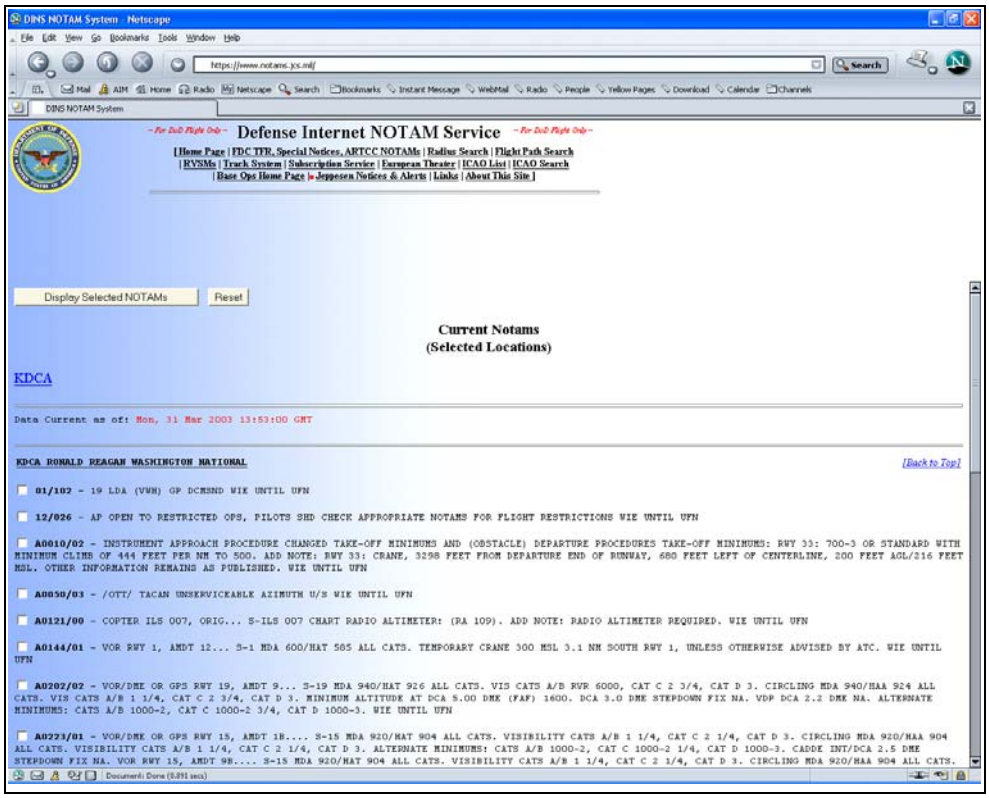


**Figure 15. DINS Query Page**

Military users and National Geospatial-Intelligence Agency (NGA) receive NOTAM data via the query/distribution function of the DINS system. The DINS system also provides a system interface to support AMC in its initiative to improve the command, control, communication, and computers (C4) processes in order to effect a more efficient and reliable global air mobility (airlift and air refueling) capability.

The BIRDTAM (Bird Strike Warnings) hypertext markup language (HTML) page for the German Military Geophysical Office (GMGO) in Traben-Trarbach, Germany is available to the joint DoD/FAA Internet NOTAM system. This web page consists of a graphic display showing bird concentrations and affected areas using the Geographic Reference System (GEOREF). Figure 16 shows an example of the BIRDTAM web page.

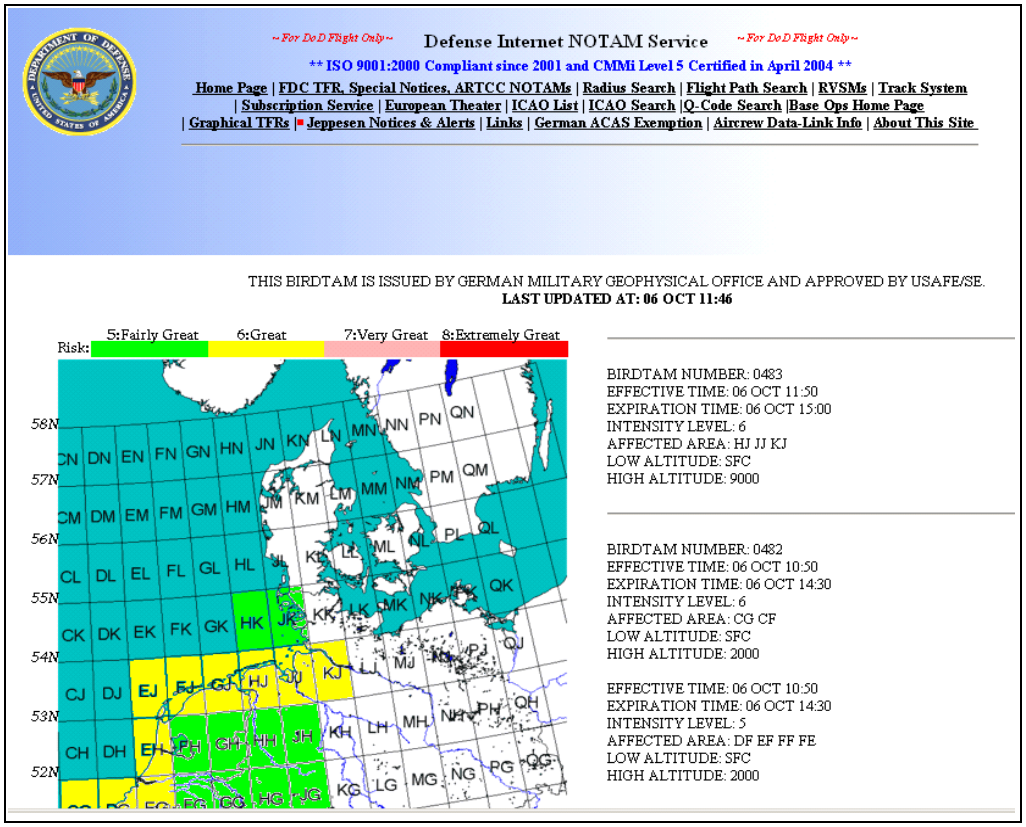


**Figure 16. BIRDTAM Display**

### 3.3.1.5 National Operation Data Archive and Database Master (NODA)

The National Operational Data Archive (NODA) was implemented by NAIMES at the ATCSCC to provide near real-time access for USNOF specialists to historical NOTAM data. The system was enhanced in Fiscal Year (FY) 2004/2005 to provide an improved user interface and allow for more sophisticated searches of NOTAM data in the NOTAM archive.

### 3.3.2 National Airspace System Resources (NASR), eNASR, and SPIRIT

The National Airspace System (NAS) Resources (NASR) System was implemented at the FAA's National Flight Data Center (NFDC) currently located and operated at the FAA Headquarters in Washington, D.C. to support the day-to-day management of NAS data used by the FAA to produce various aeronautical publications. The mission support version of NASR/eNASR is located at FAA HQ at FOB10A, with SPIRIT, the high-availability operational version located at the ATCSCC in order to support USNS, AISR, and other NAS operational systems.
The web-services components of NASR and eNASR provide users with XML-based web services for the receipt of remote inputs and for the retrieval of data through browser and system interfaces. NASR data is web accessible to both FAA and industry partners.

NASR/eNASR data consists of fixed aeronautical information and includes information about airports, runways, location identifiers, navigational aids, instrument landing systems, fixes, airways, military training routes, and towers. The NASR/eNASR data is stored in the system's relational databases. The NASR client-server software architecture is made up of a COTS RDBMS, geographical information system (GIS) and report generation tools. All key software components on the client have been integrated within the Oracle Forms environment in order to provide a single user point of entry into the system. Both Crystal Reports and MapObjects are called from the NASR Forms using Foreign Function Interfaces. The GIS Server was developed to manage the connections between the client and the ArcSDE server and to minimize the number of licenses required. The daemon (server) component is a nightly job that processes all pending transactions and which creates required output products. The eNASR DMZ comprises a 4-tier J2EE architecture using the iPlanet web server, Oracle's J2EE Application Server and the Oracle database. Developed software on the application and web servers is used to service change requests and to retrieve NASR data. The NASR/eNASR system performs the following functions: input, display, storage, transmission, and receipt of aeronautical information.

The system's user community is comprised of the NFDC specialists, who provide maintenance support and produce the aeronautical information data files distributed via CD-ROM and File Transfer Protocol (FTP). Other users (systems or organizations) include: En Route Host, M1FC, AISR, USNS, Obstruction Evaluation/Airport Airspace Analysis (OE/AAA), AVN, NACO, and the FAA Technical Center. In addition, the National Imagery and Mapping Agency Aerospace Center (NIMAAC), producer of military maps and charts, and the Jeppesen/Sanderson Company, a private enterprise that supplies maps to industry and other customers, also receive NASR data. The NFDC distributes the National Flight Data Digest (NFDD), a daily log of transactions, to all users (85 subscribers and 436 ad hoc users).

In addition to the primary H/W at the FAA HQ and ATCSCC, NASR/eNASR includes three remote servers that provide chart makers and publishers of aeronautical data with the current NASR data on a local database. These are the National Aeronautical Charting Office (NACO), producer of official government maps, the National Geodetic Survey office of NOAA, and the FAA's Technical Center.

The client-server NASR system was upgraded in FY02 to support the receipt of 5010 data via a remote interface using XML. With the deployment of eNASR in FY05, NASR data inputs from external sources can be received via XML files in accordance with published NASR XML schemas. External inputs are treated as change requests to the NASR data. In FY03, a replicated

master copy of the NASR data (SPIRIT database) was established at the ATCSCC as part of NAIMES. SPIRIT forms the database infrastructure for integrating NASR data with other data sources and will be accessible to both FAA and industry partners.

NASR includes the following features:

- NASR Data Entry and Displays—the NASR client uses a graphical user interface integrated with map displays. An MTR display is shown in Figure 17.

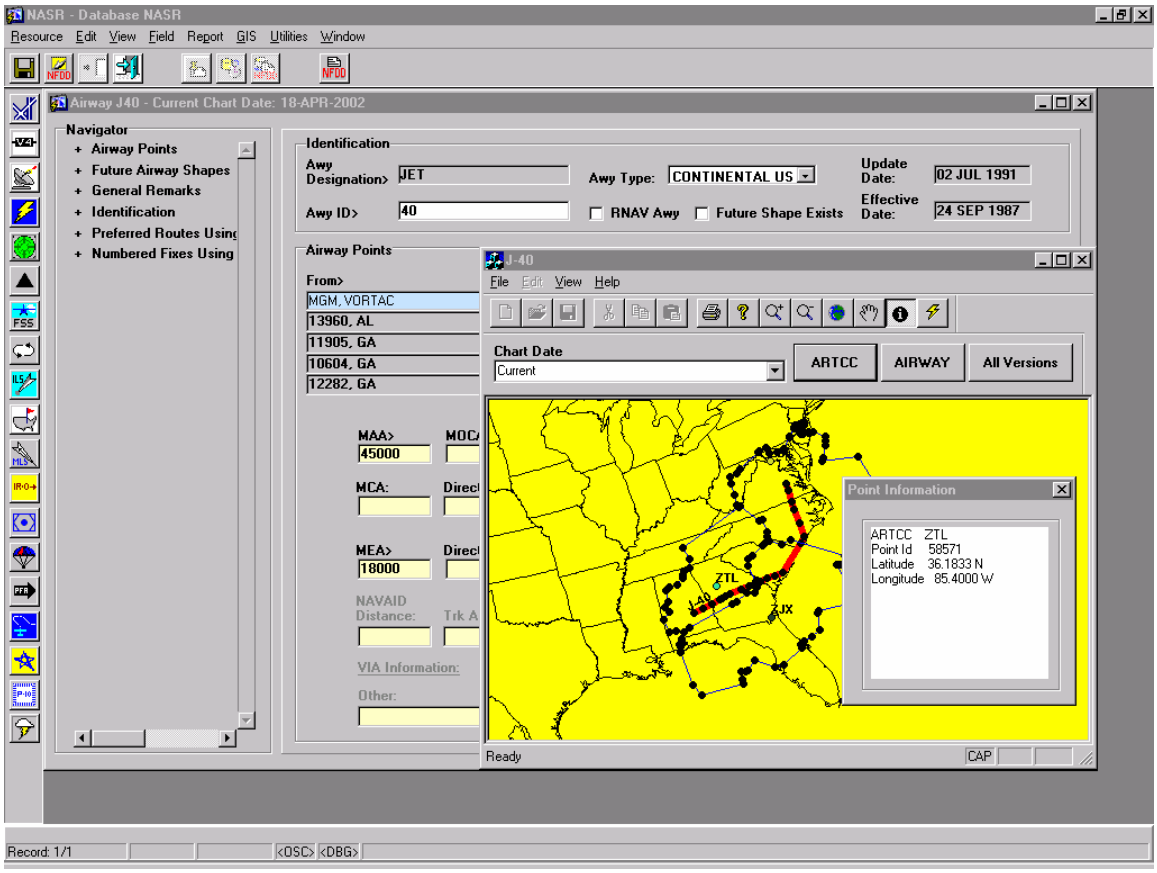


**Figure 17. Sample MTR Display**

- NASR Data Validation—NASR performs various types of validation to ensure the quality and integrity of data distributed by NFDC to external users and publication producers.
- NASR Reports and Queries—NASR provides over 50 preformatted reports through menu selection for display and printout. These reports are used internally within NFDC in support of day-to-day operations.
- NASR Auditing and System Management—a full audit trail function on every transaction is available to the NASR Database Administrator.
- NASR Output Products—In addition to ad-hoc reports, NASR generates various data and paper products. Paper products include the Air Traffic Fact Book, Part 95 Amend/Consolidation, NFDD, and Location Identifier Handbook. Some of these are also available in Portable Document Format (PDF) format for download via the NFDC FTP site. The system also produces data outputs, such as the subscriber data files, that are used by NACO to generate other aeronautical publications (e.g., Airport Facility Directory) and

charts, and to feed the various ATC systems with national data. Most of these products are produced on a 56-day publication cycle.

- NASR/eNASR Change Request Processing—Remote users can submit change requests to NASR data via a standard web browser available via an HTTPS Internet connection. NFDC specialists review change requests prior to insertion into the NASR database. Figures 18 and 19 illustrate the browser interface Query and Result Page by which a user can retrieve specific NASR resource data.

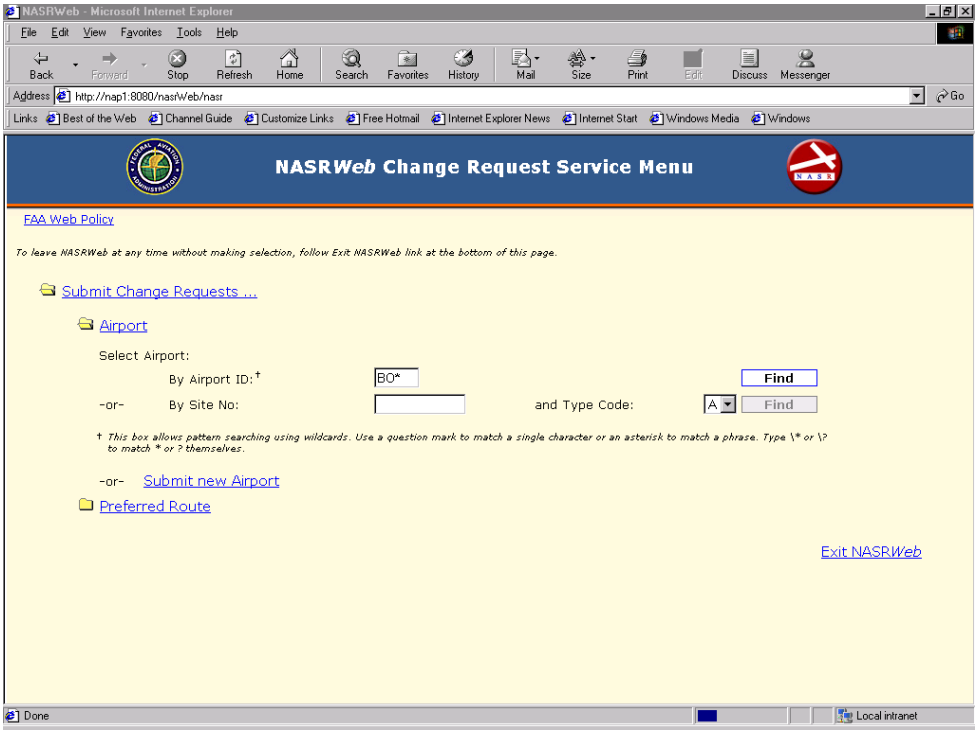


**Figure 18. eNASR Query Page**

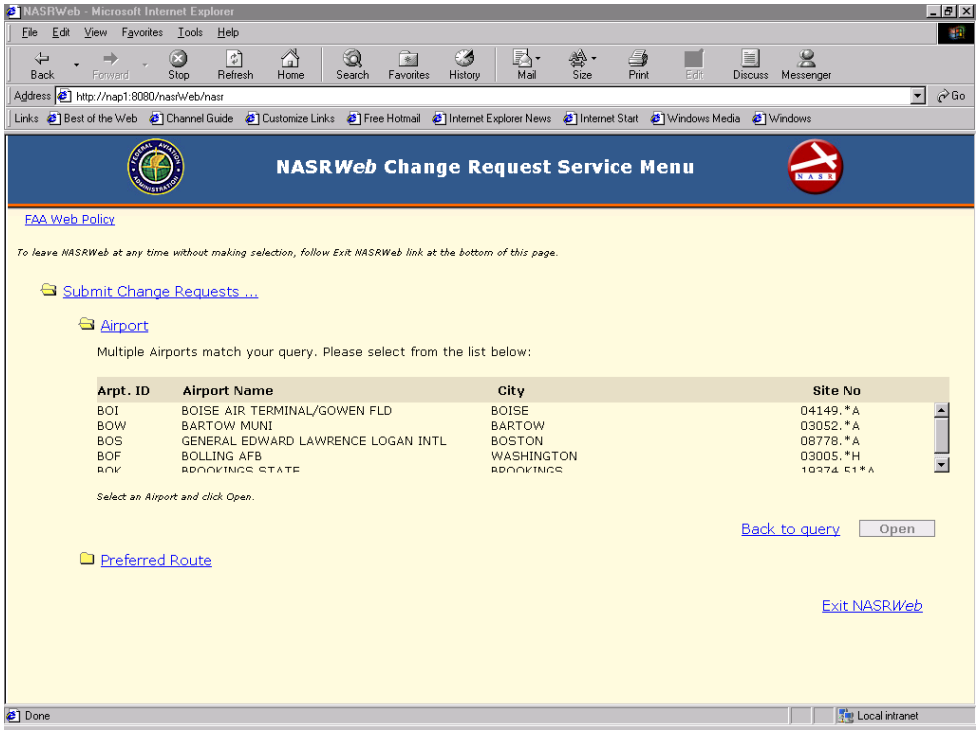


**Figure 19. eNASR Results Page**

The eNASR worksheet provides the end user functions to enter all types of changes supported by the NASR Client. Figure 20 illustrates a portion of the Airport Worksheet. After entering changes, the user may submit the worksheet for processing. Any errors detected in the submitted data are displayed on the worksheet for correction. Once the submitted data is free of errors, the appropriate change requests are generated for further processing by NFDC specialists using NASR Client applications.

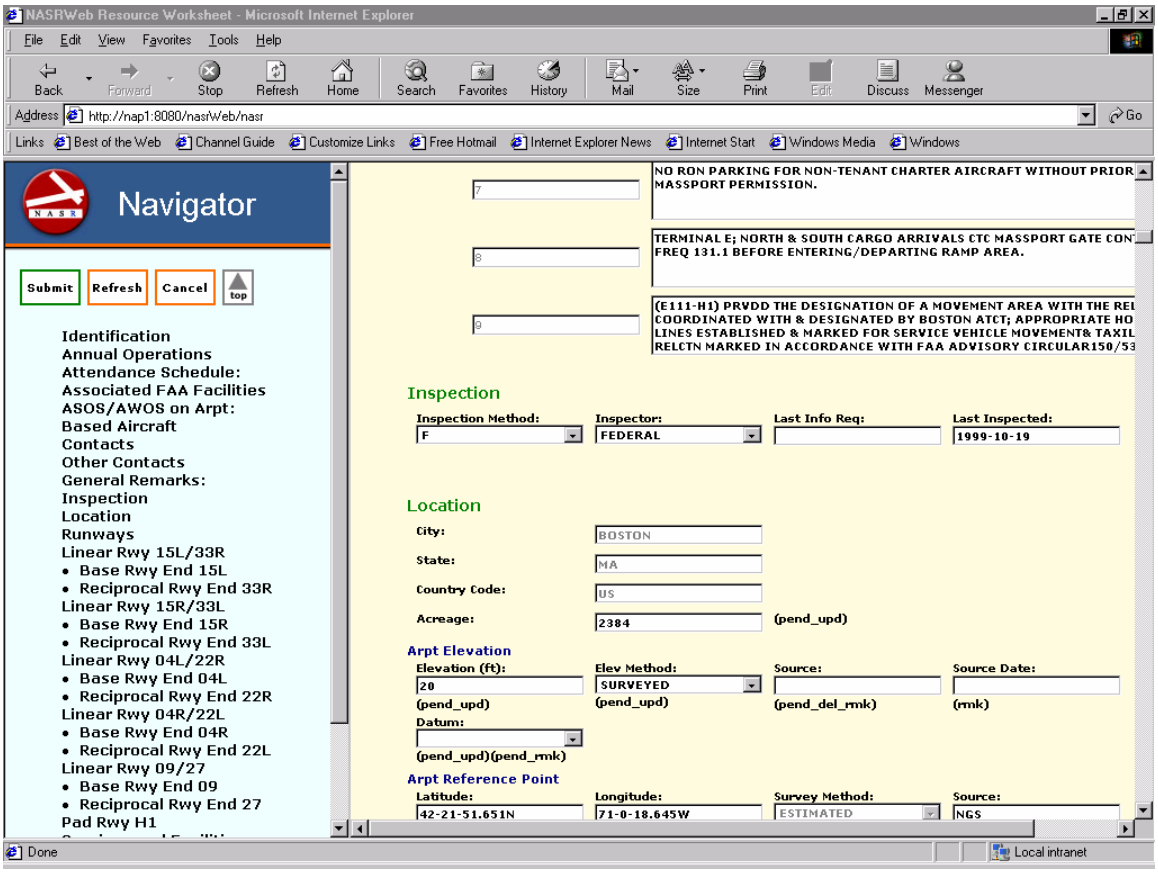


**Figure 20. eNASR Airport Data Worksheet**

The NASR/eNASR software architecture shown in Figure 21 components includes a COTS DBMS, GIS and report generation tools.

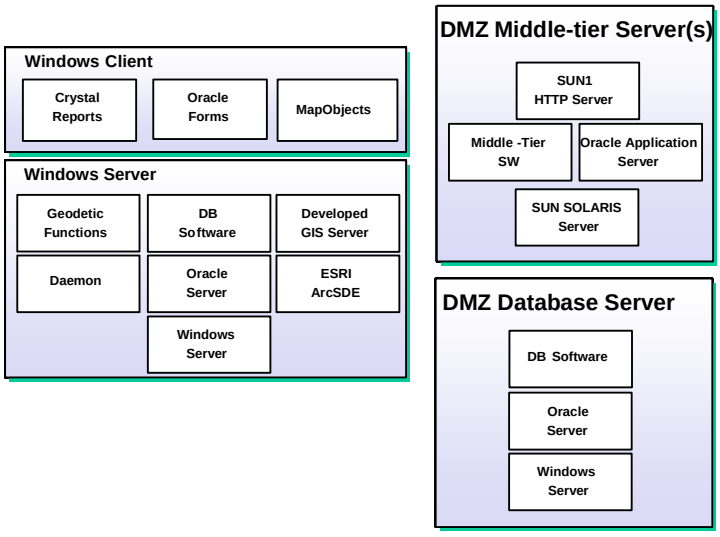


**Figure 21. NASR/eNASR Software Architecture**

### 3.3.3 Data Access Portals

#### 3.3.3.1 Aeronautical Information System Replacement (AISR)

AISR is joint FAA and DoD web-enabled system that allows FAA, general aviation, and military users to collect and distribute weather, domestic/international aviation flight plans, NOTAM messages, pilot report (PIREP) messages, and other operational aeronautical data and information to all Air Traffic facilities and authorized users. FAA users connect to AISR via FTI/FIRMNet, DoD users connect via NIPRNET, and General Aviation Users connect to AISR via the Internet. Military users have the capability to consolidate NOTAMs and flight-planning functions within a single AISR workstation however; the DoD currently requires the military to use DINS to process NOTAMs. Within the FAA, AISR is currently installed in all 61 FSSs, in all ARTCCs and Regional Offices, in approximately 100 ATCTs. At AFSSs, AISR is used as a back-up to OASIS and M1FC to enter and receive NOTAMs. AISR will be removed from the AFSSs after the transition of these facilities from the FAA to Lockheed-Martin is completed.

##### *3.3.3.1.1 Military Functionalities*

AISR provides web interfaces to perform the following functions:

- Provide MBO flight plan filing, amendment and cancellation capabilities
- Provide MBOs with the capability to query NOTAM data from the military's DINS system
- Provide capability to send/receive Service B messages using their existing DINS hardware
- Provide capability to deliver roger/reject messaged received from NADIN to appropriate user
- Reconstruct events
- Implement Role Based Security
- Send Free Form Service B Messages
- Receive the NASR data required for Flight Plan Filing
- Make Flight Planning Documentation (AIM, etc.) available
- Validate routes

##### *3.3.3.1.2 FAA Functionalities*

AISR will initially provide web interfaces to perform the following functions:

- Civilian flight plan filing and messaging over FIRMNET
- Send/receive Service B messages using their existing AIS hardware
- Deliver roger/reject messages received from NADIN to the correct user
- Ingest, store and manage Weather Message Switching Center Replacement (WMSCR) weather data and weather observations
- HOST backup message store/forward for ARTCCs
- Redundant operating locations (IOC redundancy at FOB10A)

- Create NOTAMs and query the NAIMES NOTAM database over FIRMNET by FAA facilities

Figure 22 shows a sample AISR Flight Plan data entry screen.

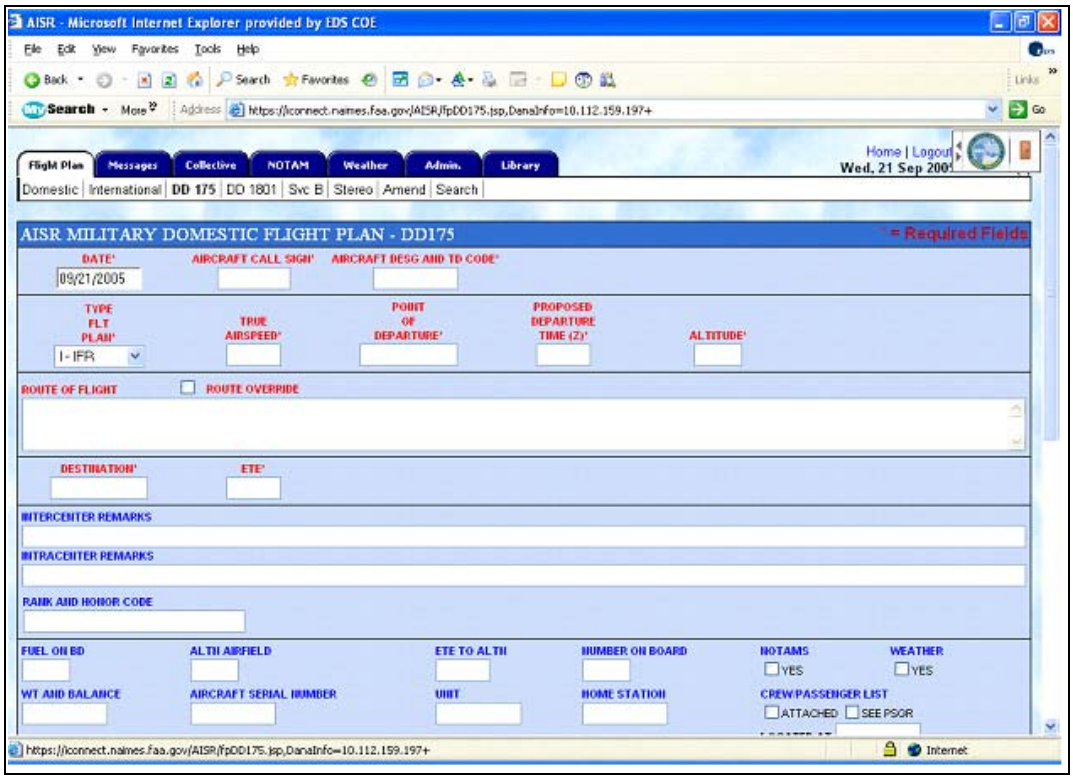


**Figure 22. AISR DD175 Input Screen**

### 3.3.3.2 ATCSCC Portal

The ATCSCC Portal (Aeronautical Information Distribution/Portal) provides access to critical NAS data that was not readily available to ATCSCC, ARTCC, and other NAS users. This web portal provides a one stop shop for access to NAS data and the portal will continue to be enhanced to provide expanded data distribution capabilities (user and system distribution). The system includes links to multiple systems (ETMS, USNS, NOAA, DINS, NASR, etc.). A similar website was developed for the airlines in support of CDM. This popular website is being redesigned to improve ease-of-use, and provide users with access to more data sources.

The portal's capabilities include:

- NOTAMs
- ATCSCC Weather
- FAA Aviation Digital Data Service NOAA
- Radius Search (NOTAM)
- Radius and Flight Path Search (NOTAM)

- Atlantic/Pacific Track Messages
- A-TQS
- Reduced Vertical Separation Minimum (RVSM)
- ATCSCC Operational Information System (OIS)
- TFRs and GTFRs
- Airport Arrival Demand Chart
- Route Management Tool (RMT)
- ATCSCC Real-time Airport Status
- Runway Visual Range (RVR)
- ATCSCC Advisories Database

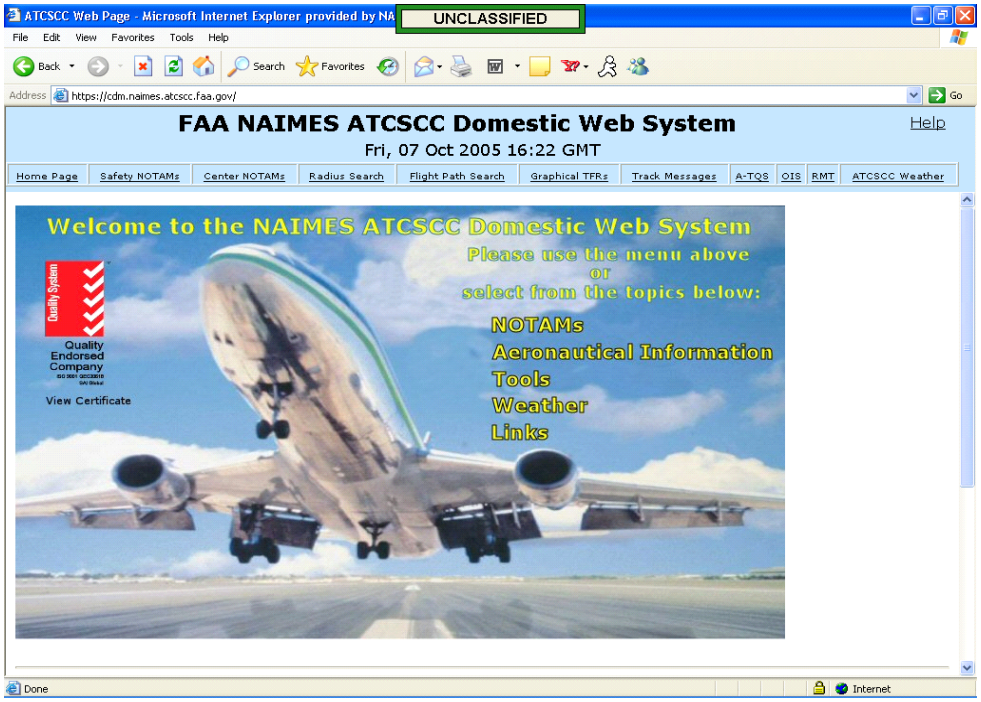


**Figure 23. NAIMES Portal Home Page**

### 3.3.4 Aeronautical Integrated Data Access Portal (AIDAP)

The Aeronautical Integrated Data Access Portal is AIDAP is an on-demand XML Service utilizing current Internet-based technologies to replace the existing legacy service (604 Circuit) which was decommissioned on 5/31/2005. The 604 circuit was established in the 1970's to provide alphanumeric weather and NOTAM data to the aviation community as a supplement to the two-way teletype circuits from the Weather Message Switching Center (WMSC) in Kansas City. The 604 Circuit was a 1200-baud, one-way, multipoint circuit.

In May 2002, the FAA conducted a survey to identify 604 Circuit users and the data they utilized. When the survey data was analyzed, the FAA decided that it would be more cost effective to establish an on-demand service for NOTAM and weather data using current standards-based technologies. AIDAP was developed to meet that need. AIDAP provides NOTAMs and weather products over the web to authorized users, who must first perform an authenticated log-in. The development and implementation of AIDAP has been accomplished in two phases. Phase I provided XML service for NOTAM data. Phase 2 is a weather retrieval service for over 2,500 National Weather Service Products. AIDAP allows users to retrieve NOTAMs using search criteria, and weather products can be retrieved for up to the preceding 72 hours. Per each user request, the system retrieves existing data stored in NAIMES databases and returns them in XML format.

#### 3.3.4.1 Collaborative Decision Making (CDM)

Collaborative Decision Making (CDM) is a joint government/industry initiative aimed at improving air traffic flow management and flight operations decision making through increased information exchange. This technical data exchange was established to benefit both the FAA and Industry. CDM provides shared, real-time information between the ATCSCC and participating Airline Operations Centers (AOCs) during capacity-constrained conditions such as severe weather. The benefits of CDM include:

- Greater efficiency for airline operations
- AOCs gain greater autonomy over their flight operations—deciding which flights to delay or cancel, which arrival slots to fill at impacted airports
- ATCSCC gains more realistic estimates of system demand, enhancing system predictability and efficiency
- AOC actions can eliminate or reduce ATCSCC need to impose ground delay or ground stop programs
- Savings to industry: $2,641.9 million estimated reduction in costs to the airline industry through the year 2016[1]
- Based on an established FAA formula, this number becomes $8,916.4 million if passenger value of time is taken into account[1]

[1] Information was obtained from a 1999 MITRE Center for Advanced Aviation System Development (CAASD) briefing and US Airways CDM training material

#### 3.3.4.2 PilotWeb

The PilotWeb portal provides GA pilots and other NAS users with a one-stop shop for access to information for pre-flight planning. PilotWeb provides access to current NOTAM information within USNS. Because notices, restrictions, and advisories may change at any time and without notice, PilotWeb is informational in nature and pilots are advised to obtain a thorough pre-flight briefing prior to attempting any flight operation in the NAS.

PilotWeb includes links to the following services:

- NOTAMs
  - Safety NOTAMs
  - GTFRs
  - Center NOTAMs
  - Published NOTAMs
  - NOTAM Radius Search
  - NOTAM Flight Path Search
  - FAA Order 7930.2, Notices to Airmen (NOTAMs) Approved NOTAM Contractions
- Weather
  - NOAA Aviation Weather Center
  - FAA Aviation Digital Data Service
  - NOAA National Weather Service
- Aeronautical Information
  - ATCSCC OIS
  - WAAS Availability Prediction System
  - Advisories Database
  - ATCSCC Real-time Airport Status
  - Track Messages
  - Reduced Vertical Separation Minimum
- Tools
  - ICAO Listing
  - Airport Arrival Demand Chart
  - RMT
  - RVR
  - Special Event Reservations (e-STMP)
- Links
  - NAIMES Program Home Page
  - ATCSCC/Fly Home Page
  - FAA Information for General Aviation
  - FAA Home Page
  - FAA ATO
  - Flight Standards Aviation Information
  - National Business Aviation Association (NBAA) Home Page
  - Experimental Aircraft Association (EAA) Home Page
  - AOPA Home Page

The PilotWeb site incorporates many features to assist the user when retrieving aeronautical information requests. Real-time NOTAM data is available, and contains all NOTAMs validated by USNS, which includes domestic, international, military and from Flight Data Centers (FDCs). Users may select only those NOTAMs they wish to display using the check box provided for each NOTAM and clicking the Display Selected NOTAMs button.

The system will allow users to request NOTAM information in either Raw Text or Report Text format. Raw Text is the international machine readable ICAO format with multiple report fields, NOTAM series, and NOTAM numbers displayed. Report Text is the translated NOTAM summary

format which users find desirable. Report Text format will also insert a blank line between each NOTAM to improve their readability.

### 3.3.5 Central Altitude Reservation Function (CARF)

The Central Altitude Reservation Function (CARF) office located at the ATCSCC is responsible for coordinating military and civilian altitude reservations (ALTRVs) for operations within their area of jurisdiction within the NAS. CARF personnel determine when military operations, national security aircraft operations, and other civilian emergency operations require special traffic management authorization because the operations are not standard under ATC rules and regulations. An ALTRV may include the departure, en route, and arrival phases of flight. In areas of adequate ATC radar coverage, the approved ALTRV will receive priority ATC handling for requested times, routes and altitudes. In areas of no radar coverage, the approved ALTRV will normally be protected by an international NOTAM issued by the NAIMES/USNS System.
The NAIMES program provides workflow assistance to CARF by providing access to existing NAIMES products and services and software enhancements to the existing CARF system. Stakeholders for the system include the ATCSCC, DoD, commercial avionics and missile/rocket companies.

### 3.3.6 NAIMES Capstone/WAAS/GPS

The Alaskan Region's Capstone Program improves aviation safety and efficiency through installation of government-furnished GPS-based avionics and data link communications suites in commercial aircraft. The WAAS is a GPS-based navigation and landing system that provides precision guidance to aircraft at thousands of airports and airstrips where there is currently no precision landing capability.

The WAAS-capable avionics and the introduction of special rulemaking drove the FAA Alaskan Region Capstone Program's requirement for development and implementation of a WAAS outage prediction tool and the distribution of this aeronautical information directly to aviation users. NAIMES, in cooperation with the FAA Capstone and WAAS Program Office, provides Alaska system availability information to the NAS and the flying public through a web-based graphical interface.

NAIMES provides NAS-wide system availability information to the NAS and the flying public through a web-based graphical interface. The web site features interactive maps of predicted non-precision approach (NPA) and en route outages. Users may use the pan and zoom functions to obtain close up views of the areas of interest. In addition, users may query for airport specific NPA outage predictions with prompt resolution.

The NAIMES program office, working in corporation with the Department of Defense GPS Master Control Station, collects GPS satellite outage information which is reported by the US NOTAM System to the domestic and international aviation communities. NAIMES also uses the GPS satellite outage data to compute site specific non-precision approach availability at domestic and international locations.

Figure 24 shows an example of the NPA Outage Predication Display.

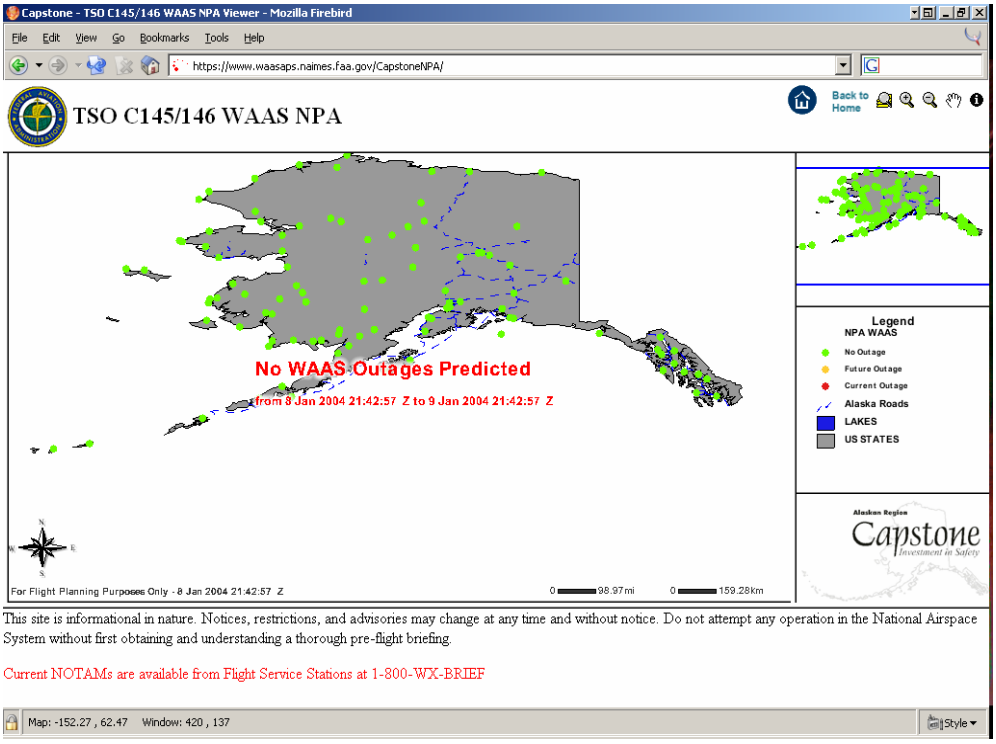


**Figure 24. NPA Outage Predication Display**

### 3.3.7 Airline Traffic Query System (A-TQS)

A-TQS provides users with an easy to use ETMS-based tool to track any commercial flight in the continental USA. It provides the controller block, and a map showing current location, filed flight plan, and weather. This system was developed by NAIMES to provide ATCSCC, Transportation Security Agency (TSA), and other FAA users this capability utilizing only a web interface.

Figure 25 shows a sample A-TQS results page. The TQS result page graphically displays the filed flight plan information (from HOST), actual aircraft location (from ETMS), and the current Next Generation Radar (NEXRAD) system.

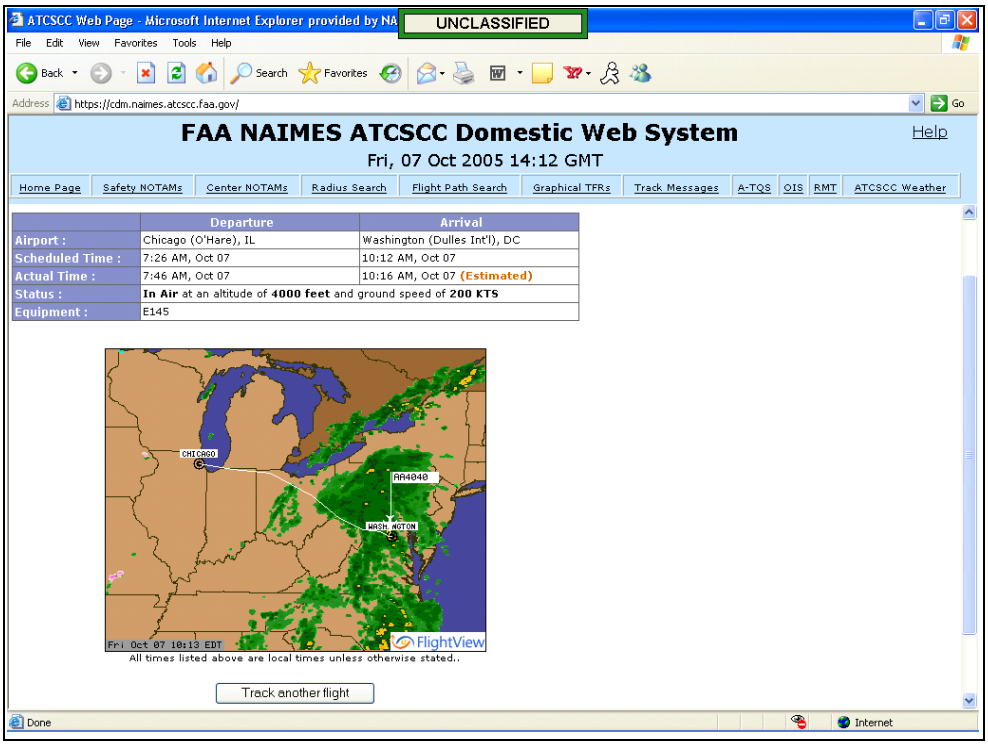


**Figure 25. A-TQS Display**

The flight information block is also displayed as part of the A-TQS display. It provides the user with the following information:

- Flight number and airline
- Airport
- Scheduled time (departure/arrival)
- Actual time
- Status (altitude and speed)
- Equipment (type of aircraft)

Figure 26 shows a sample flight information block.

**Delta Air Lines flight number 45 (DL45)**

| | Departure | Arrival |
|---|---|---|
| Airport : | Chicago (O'Hare), IL | Washington (Dulles Int'l), DC |
| Scheduled Time : | 7:26 AM, Oct 07 | 10:12 AM, Oct 07 |
| Actual Time : | 7:46 AM, Oct 07 | 10:16 AM, Oct 07 **(Estimated)** |
| Status : | **In Air** at an altitude of **4000 feet** and ground speed of **200 KTS** | |
| Equipment : | E145 | |

**Figure 26. Flight Information Block**

Figure 27 shows a sample flight query results.

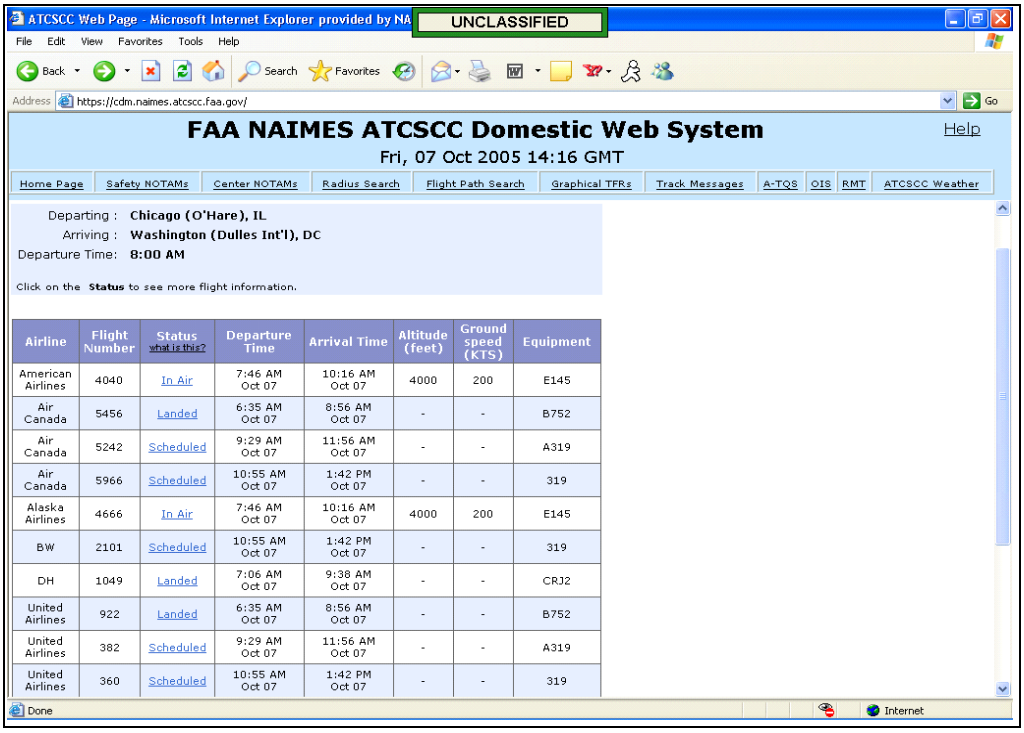


**Figure 27. A-TQS Flight Query Results**

### 3.3.8 Safe Flight 21 (SF-21) and Flight Information Services Data Link (FISDL)

SF-21 is a joint cooperative effort between government and industry to develop and demonstrate a set of free flight operational enhancement capabilities that are derived from evolving Communications, Navigation, and Surveillance (CNS) technologies. The underlying core concept of SF-21 is the sharing of real-time traffic, aeronautical, and weather information between air traffic controllers and pilots in the cockpit to provide enhanced operational capabilities.

FISDL is a very high frequency (VHF) Data Link (VDL) Mode 2 communication link to a receiver installed in any aircraft that provides pilots and flight crews of properly equipped aircraft with a cockpit display of aviation weather, aeronautical, and flight operational information. Land-based transmitter sites distributed across the USA will broadcast weather and other important flight

information to these airborne receivers. A separate cockpit display called a Multifunction Display system (MFD) will format and present stored weather or flight advisory information on pilot demand. Data linked flight information will provide information enabling better and earlier decisions when a pilot is confronted with unfavorable weather or other potentially hazardous condition.

FISDL information may be displayed in both textual and graphical formats such as NOTAM text and graphical TFRs. Cockpit displays of this information are not appropriate for tactical navigation and are intended for situational awareness purposes only. Pilots should stay clear of any geographic area displayed as a TFR NOTAM. Pilots should contact FSSs and/or ATC while en route to obtain updated information and to verify the cockpit display of NOTAM information. FISDL information supports better pilot decision making by increasing situational awareness. Better decision-making is based on using information from a variety of sources.

NAIMES is supporting both of these programs by providing text and GTFR information for further dissemination to pilots. SF-21 and FISDL distribution of NOTAM information will allow pilots to readily identify the location and status of TFRs and to determine if their planned flight operations will be impacted. NAIMES support for these programs contributes to improved aviation safety, capacity, and efficiency and reduced pilot deviations.

### 3.3.9 FlightAssist

FlightAssist is a PC-based flight planning application designed for FAA and DoD. It is based on the commercial Golden Eagle FlightPrep product which was developed to provide online flight planning capabilities. FlightAssist saves flight plan data utilizing XML (AIXM/NAIL) and has features such as current TFRs, and topographic and flight planning charts. FlightAssist allows users to generate flight plans, flight charts, and print flight logs. Future versions of FlightAssist will have the capability to export flight plans directly into NAIMES.

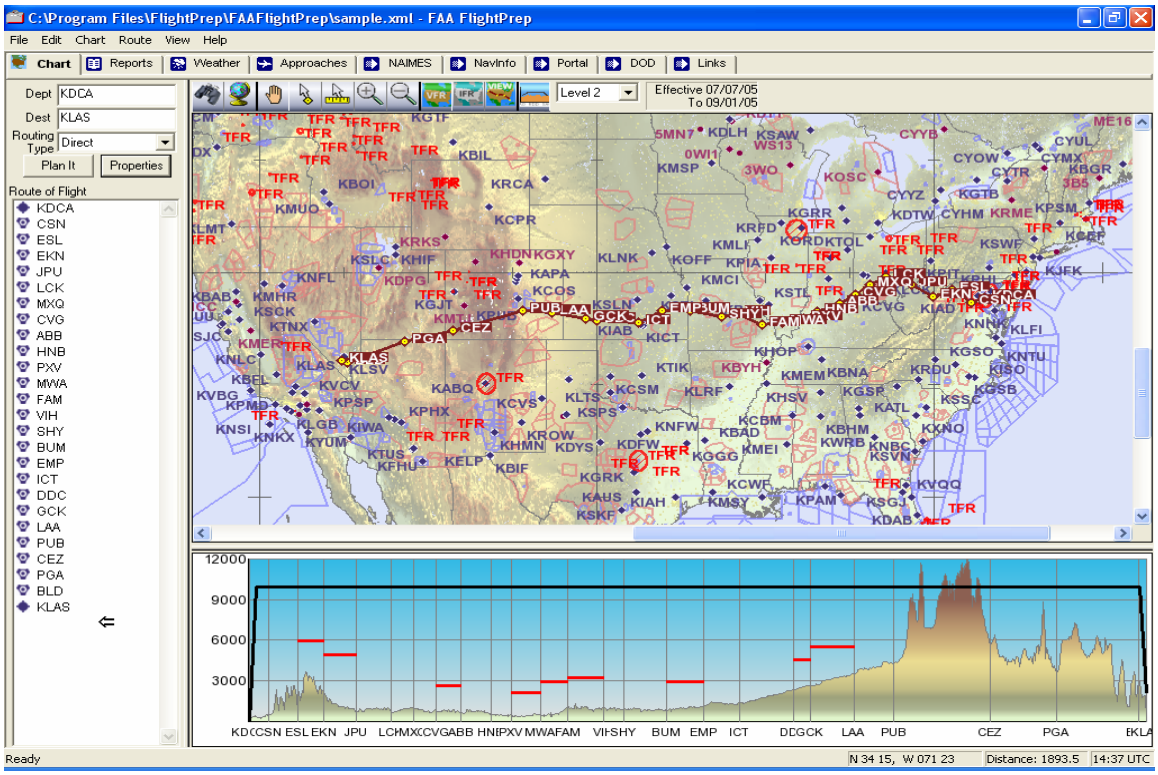


**Figure 28. Flight Assist**

### 3.3.10 NAS/DoD Program and Infrastructure Services

This section provides descriptions of program and infrastructure services provided by NAIMES to the FAA and DoD

#### 3.3.10.1 Chief Information Officer (CIO) Authorized NAS IAP/ISP Services

The ATCSCC NAS IAP was authorized by FAA Orders 1370.82 and 1370.83, and was designated by the CIO (AIO-1) and ATO as the only approved NAS IAP. NAIMES developed and manages the IAP for ATO/AIO to support NAS customers. NAIMES provides systems administration, network administration, firewall administration, router administration, DNS administration, and monitoring support for the IAP. The IAP is protected by routers and firewalls that restrict access from the Internet to specified IP addresses and ports. The ATCSCC IAP also allows selected users in the ATCSCC to access the Internet.

#### 3.3.10.2 Salt Lake Center (SLC) NAIMES Remote Site

The SLC NAIMES Remote Site currently provides NAIMES with a disaster recovery solution for the core NAIMES products and services supporting NAIMES FAA and DoD customers. Figure 8 shows the SLC remote site configuration as of FY2005.

#### 3.3.10.3 Wide-Area Network Connectivity

NAIMES is connected to several wide-area networks for the purpose of collecting and distributing NOTAM information. The networks that NAIMES interfaces with include the following:

- NADIN MSN
- NADIN PSN
- AUTODIN
- NIPRNET
- FTI Administrative Network
- NAS IAP
- FTI

NAIMES uses the NADIN I MSN, NADIN II PSN, AUTODIN, NIPRNET and FTI in its operational environment for NOTAM, flight plan, weather, and NAS Resource processing. NAIMES uses FTI as the backbone of its NOTAM Distribution System (NDS) for distributing NOTAMs to terminal facilities. Other aeronautical information is available via FTI (Operational and Mission Support) and Internet.

#### 3.3.10.4 Domain Name System (DNS) Services

In support of the NAS IAPs, NAIMES provides redundant DNS services for domain name resolution of Uniform Resource Locator (URL) strings to IP addresses. Two DNS servers are located at the ATCSCC IAP and duplicate DNS servers are located at the FAA HQ IAP for redundancy. These DNS servers are authoritative for sub-domains under both the 'faa.gov' and 'jcs.mil' domains. The sub domains include, but are not limited to, the following:

- NOTAMs.faa.gov
- NOTAMs.jcs.mil
- nas.faa.gov
- nas.jcs.mil
- naimes.faa.gov
- naimes.jcs.mil
- nasdev.faa.gov
- nasdev.jcs.mil
- atcscc.faa.gov
- aerospacecommission.gov (for the Presidential Commission on the Future of the Aerospace Industry)

#### 3.3.10.5 NAS Network Information Center (NIC)

The NAS NIC provides information and services that are mission-critical to NAS' operation. NAS NIC performs the following functions:

- Operates NAS-related DNS servers
- Maintains NAS IP addresses registry
- Coordinates with FAA Information Security groups regarding security incidents and network vulnerabilities
- NAIMES provides IP address assignments for all NAS programs
- Provides 24x7 Technical support services from through the Technical Support Help Desk

#### 3.3.10.6 24 x 7 Technical Support Help Desk

The NAIMES Technical Support Help Desk is located at the ATCSCC. The team is staffed 24 hours a day, 7 days a week to field phone calls, respond and resolve any NAIMES issues, and to monitor NAIMES system at the ATCSCC and the NAIMES remote site at Salt Lake City. If these technicians cannot resolve the problem immediately, the problems are escalated to the appropriate engineer or other support groups for resolution. Every escalated incident is logged in the NAIMES problem-tracking database and remains an active incident trouble report until it is resolved. Resolved incidents and problems are kept on the database indefinitely for historical reference, root-cause and trend analysis, and captured and reported under the NAIMES Quality System program metrics.

## 3.4 Modes of Operation for the Current System

This section describes the two major modes of operation for NAIMES—operational and emergency backup. NAIMES applications and functions are shown as follows:

| APPLICATION/FUNCTION | PRIMARY SITE (ATCSCC*) | REMOTE SITE (SLC*) |
|---|---|---|
| USNS & Master Database | X | X |
| NOTAM IP / NOTAM Data Distribution (NDS) (to Air Traffic Control Towers (ATCTs), Federal Contract Towers (FCTs), and Terminal Radar Approach Control (TRACON) facilities) | X | X |
| NOTAM Entry System (NES) | X | X |
| Graphical Temporary Flight Restrictions (GTFR)/ Special Use Airspace (SUA) | X | X |
| Defense Internet NOTAM Service (DINS) | X | X |
| National Operational Data Archive (NODA) & Database Master | X | |
| Aeronautical Information System Replacement (AISR) | X | X |
| ATCSCC Domestic Web System (Aeronautical Information | X | X |

| APPLICATION/FUNCTION | PRIMARY SITE (ATCSCC*) | REMOTE SITE (SLC*) |
|---|---|---|
| Distribution/Portal) | | |
| PilotWeb (General Aviation Website) | X | X |
| Central Altitude Reservation Function (CARF) | X | |
| Capstone/Wide Area Augmentation System (WAAS) (System Availability – Alaska and NAS-wide) | X | |
| Global Positioning System (GPS) Outages (USNS and DINS) | X | |
| Aeronautical Integrated Data Access Portal (AIDAP) (604 Circuit Replacement) | X | X |
| NAS Resources (NASR/eNASR) | FAA HQ | |
| NAS Network Information Center (NIC) | X | |
| NAIMES Technical Support Help Desk | X | X |
| United States NOTAM Office (USNOF) Support | X | |
| NAS Domain Name System (DNS) (to be added) | X | X |
| CDM | X | X |
| XML Interfaces | X | X |
| IPv6 Implementation | | |
| NAS Gateway | X | |
| FlightAssist | | |
| Local NOTAMs | | |
| JMPS Interface | | |
| Enterprise Architecture Single Sign-on Service | | |
| SPIRIT (database only) | X | |
| NAIL (AIXM Superset) | | |
| Enhanced Graphical NOTAMs | | |

* Unless otherwise indicated

**Table 2. Current System Modes of Operation**

## 3.5 User Classes and Other Involved Personnel

### 3.5.1 Organizational Structure

This section describes the existing organizational structures of the various user groups and user classes that are involved with the current NAIMES system.

### 3.5.2 Profiles of User Classes

There are 7 basic types of users of NAIMES support and services. They have various roles and responsibilities and range in access privileges from all privileges to very limited access privileges. These user types and their roles, responsibilities, and access privileges are:

- NAIMES Support Staff – system engineers, developers, administrators, and other support staff that are responsible for the installation, development, implementation, and maintenance of all NAIMES systems and services.
- Database Users - A user can perform an operation on a database object (such as a table or view) if that user has been authorized to perform that operation. Certain database users (NGA) and AMC) are allowed to perform queries and select statements, and to restructure tables within the database. Other general users may perform database queries but only through other programs that act as a front end to the database.
- DoD Military Specialists – Military specialists associated with the NAIMES program (DINS, USNS and AISR) are military civilian and active duty personnel that administer military user accounts on the Oracle database and web server at the ATCSCC and SLC NAIMES facilities. The accounts they administer include DINS and AISR. Additionally, the military specialists are responsible for the integrity of the data in the NIPRNET Oracle database. These personnel have privileges to create, modify and delete accounts that they.
- FAA USNOF Specialists – The FAA USNOF Specialists are FAA personnel that work in the USNOF at the ATCSCC facility that receive and review raw or candidate FDC and military NOTAM data. If the information is properly formatted, the FAA specialists will release the candidate NOTAM for insertion into the appropriate NAIMES database. These specialists have user privileges to reject or accept NOTAM data.
- FAA NFDC Specialists – The FAA NFDC Specialists are FAA personnel that work in NFDC at the FAA HQ that manage the NASR data using the NASR client software. NFDC Specialists receive, validate and enter data into the NASR system and generate the various output products for external distribution.
- External Users – This is the largest group of NAIMES users. The general users of NAIMES information are all NAS consumers and producers of NAIMES information. This group includes:
    - Air Traffic Controllers in FCTs, ATCTs, TRACONs, Combined En Route Radar Approach Control (CERAPs), and ARTCCs
    - Flight Service Specialists
    - FAA users at AVN/NACO and the FAA Technical Center
    - National Geodetic Survey personnel
    - Commercial Carriers and Pilots
    - General Aviation Pilots
    - Military (MBO personnel, air traffic controllers, and pilots--Army, Air Force, Navy, Marines)
    - International NOTAM Offices
    - Commercial Service Providers

        - DUATS (CSC and DynCorp)
        - Jeppesen
        - Other
    - NASA
    - FEMA
    - NGA
    - USFS
- FTI and FIRMNet users/systems requiring IP address assignment

### 3.5.3 Interactions among User Classes

NAIMES has two major categories of users—NAIMES personnel which includes FAA and contractors supporting NAIMES and users external to NAIMES (external users and test users). If an external user needs assistance, they may contact the help desk (preferred in most cases) or they may contact one of the NAIMES personnel directly (for example, during testing, during or the establishment or design of an interface). NAIMES personnel collaboratively interact with each other during design, test, development, and implementation activities. The DoD is represented in both major user categories of users—they partner with the FAA for many NAIMES components and they are also a major user of NAIMES products and services.

### 3.5.4 Other Involved Personnel

Other personnel that are involved with NAIMES include the following:

- Vice President of System Operations, ATO-R
- Information System Security Manager (ISSM), ATO-R
- Manager, NOTAMs and Aeronautical Information Systems, ATO-R
- NAIMES Program Manager, ATO-R
- Multi-domain NOTAM Distribution System Program Manager, ATO-R
- Designated Approving Authority (DAA), ATO-A
- Information System Security Officer (ISSO), ATO-A
- FAA CIO, AIO-1
- Office of Information System Security, AIS-1
- Computer Security Information Response Center (CSIRC), AIS-400
- Defense Information Systems Agency (DISA)
- U.S. Military NOTAM Office
- DoD AMC
- Airlines
- General Aviation (GA)

- FTI and NADIN Program Offices
- International NOTAM Offices

## 3.6 Support Environment at ATCSCC and SLC

System development, installation, operational support, and maintenance are performed by EDS, Northrop Grumman, OST, Science Applications International Corporation (SAIC), and LS Technologies support contractors at the ATCSCC NAIMES Operations Center located at the ATCSCC in Herndon, VA and by EDS, SAIC, and LS Technologies at the SLC remote site located at the SLC NNCC. EDS, SAIC and LS Technologies also provide or will provide development, installation, operational support, and maintenance for equipment installed at 221 FCTs, 430 ATCTs/TRACONs, 21 ARTCCs, and other facilities.

NAIMES uses COTS hardware and primarily COTS software but also includes developed application software as required. The hardware consists of Sun Microsystems servers, PC-based servers, and COTS firewalls, routers, switches, and PC workstations. The software primarily consists of Oracle back-end databases with IBM Websphere or Sun One web servers. SPIRIT uses Oracle Application Server technologies. NAIMES uses redundant systems at the ATCSCC facility to ensure high availability. The SLC site provides catastrophic recovery for critical NAIMES services in the event of a failure at the primary site. NAIMES administrative offices are located at Headquarters FAA.

NAIMES follows a Configuration Management (CM) process to ensure the integrity of critical functions in security-related hardware, firmware, and software components of the system. All baseline changes are reviewed and approved by NAIMES Change Control Board (CCB). The NAIMES CCB utilizes the NAS CCB process for all CM activities in accordance with the latest revisions of the following FAA Orders and Guidance:

- 1800.66 “Configuration Management Policy”
- 1800.8f “National Airspace Configuration Management”
- 1800.57 National Airspace Configuration Control Board
- MIL-STD-498
- FAA Acquisition Management System (AMS) CM Policy

The NAIMES Configuration Control Board is responsible for CM policy and directing all CM functions within the NAIMES Program. The NAIMES CCB establishes the initial configuration baseline and controls all changes to baselines. The CCB reviews, approves, disapproves, defers, and/or elevates changes coming before the NAIMES CCB. In making decisions or recommendations regarding proposed changes, the NAIMES CCB gives consideration to improving safety, operational effectiveness, and providing for adequate logistics support. The NAIMES CCB also ensures that proposed baseline changes with interface impact are coordinated with the affected organizations and the CCB ensures that all approved changes are completed.

Maintenance on system hardware devices and software is performed through contractor support and is restricted to authorized personnel. Maintenance follows an established process as follows:

- Step 1 – Submit Problem/Change Request. All NAIMES product defects, customer complaints, requested changes, modifications and enhancements to the hardware and software configuration baselines are directed to the problem tracking database, PR Tracker. The client as well as the NAIMES team have access to the PR Tracker database and may submit problem/change requests.
- Step 2 – Review Problem/Change Request. All open and new PR tickets are reviewed by the FAA, EDS, and, if appropriate, the Military team during a weekly Project Status Meeting. New PR tickets are reviewed, designated priority criteria, and will be either approved for work, rejected, or postponed. Open PR tickets are reviewed for status update. All issues regarding open tickets are discussed and resolved amongst the stakeholders during the Project Status Meeting.
- Step 3 – Develop, Test, and Approve the Change (Unit, System and User Acceptance testing (UAT)). The designated developer will follow steps to be executed will be determined based on the scope and the impact of individual changes. Each change will require the following steps:
    - Develop the change.
    - Test the change, the scope of testing depends on the nature of each problem/change request. Personnel are required to document the number of tests attempted, passed, and failed in the PR ticket.
    - The change is approved when it meets the acceptance criteria as stated in the System Test Plan and System Test Results document and CCB approval to implement is received.
- Step 4 – Implement to Production and Resolve Ticket
    - Install the change in production.
    - After the problem/change request has been implemented in production, the designated developer, Database Administrator (DBA), or System Administrator will update the ticket in the problem tracking database with the following information:
- Step 5 – Quality Assurance (QA) Format Review (optional)
- Step 6 – Develop/update documents and move to the CM Library

Regular backups of data and program files are required to protect information from loss resulting from hardware failure, environmental hazards, and unintentional deletion. Backed-up data is also useful for archiving and records management. Backed-up files may be stored on tape, disk, optical disk, or other media. The System Administrator performs a full backup of the system (system and data (including Oracle database) files) on a daily basis. Full backups on the Sun equipment are performed on a weekly basis, with incremental backups performed daily. Critical backups are stored in the SLC facility. System Administrators also perform a complete system backup before the system undergoes a major change (for example, installation of a new operating system), is taken down for maintenance, or before any other activity or event that could result in loss of data. Backups are protected from unauthorized access. System backups for contingency and archive purposes are stored off site at the Salt Lake City secure location.

# 4 JUSTIFICATION FOR AND NATURE OF CHANGES

This section describes shortcomings of the system that will require its modification.

## 4.1 Justification of Changes

MNS #17, National Aeronautical Information System (NAIS), revalidated March 31, 2003 captures the needs for NAS systems that process aeronautical information.

The needs are:

- High quality, timely, and secure aeronautical information;
- Interoperability and integration with other NAS information systems to minimize duplication and discrepancies;
- Streamlined business processes, with minimal manual entry and manipulation of data;
- Automated dissemination of information;
- Ability to relate data between subsystems using NASR as the metadata standard;
- Ability to receive, process, and deliver information digitally;
- Better dissemination and routing of information;
- Easy access to relevant information that is adaptable to the specific needs of authorized users; and
- Flexibility and expandability to accommodate technology changes.

NAIMES meets these needs and provides the following:

- A means to minimize data latency, duplication, and discrepancies;
- A capability to automatically and accurately collect, validate, process, store, retrieve, maintain, analyze, and disseminate NAS aeronautical data (both static and operational) with minimal human intervention;
- Interoperability with other NAS information systems;
- Quick and easy access to timely and reliable data;
- Access to the most current data to expedite traffic flow and to maximize operational system capacity; and
- Support for data transfer in accordance with ICAO standards.

Shortfalls still exist in NAS systems that process aeronautical information due to the capability and capacity limitations of the legacy systems. The shortfalls include:

- Legacy distribution systems such as WMSCR, NADIN, AWP, and M1FC
- Lack of integration of Local NOTAMs into the USNS Master NOTAM database (Local NOTAMs are not distributed beyond M1FC or OASIS)

- Duplicative, unsynchronized databases that are not distributed databases
- Continued reliance on distribution of paper copies of NAS aeronautical information
- Emergence of new standards

## 4.2 Description of Desired Changes

This section describes changes that are planned for NAIMES.

### 4.2.1 Capability Changes

The following changes capability changes are planned for NAIMES:

- Expand and enhance weather data acquisition at the source
- Continue enhancement of the Master NOTAM database to include additional NOTAM types and standard formats
- Enhance enterprise network management capabilities
- Enhance web services to support electronic flight plan filing for FAA and DoD customers
- Enhance the NAS portal to facilitate access via web services
- Enhance the graphical display of aeronautical information
- Implement IPv6 and other emerging transport technologies
- Provide additional Sun server and Websphere and Oracle application server clusters to maintain high availability
- Implement SPIRIT Portal application utilizing the NASR/eNASR to SPIRIT interface
- Complete NAIL (AIXM Superset) implementation in SPIRIT and other NAIMES applications
- Continue enhancement of the SLC remote site

### 4.2.2 System Processing Changes

This section provides a description of how changes in NAIMES or other systems closely related to NAIMES will affect the services and data available to users.

- The completion of the fielding of NDS Client PCs by the NDS Program Office will allow NAIMES to push all relevant NOTAMs in the USNS Master Database to the equipped terminal facilities.

- The expansion and enhancement of external interfaces will facilitate NAS-wide distribution of aeronautical information.

- The completion of NAIL will provide a database that implements AIXM.

### 4.2.3 Interface Changes

This section provides a description of how changes in the system will cause changes in the interfaces and how changes in the interfaces that will cause changes in the system. Most systems that interface with NAIMES use existing Internet, FTI, NADIN, and NIPRNET interfaces. Addition of new interfaces may require additional equipment (servers, routers, switches, etc.) for processing

- The expansion and enhancement of external interfaces were discussed in 4.2.2.

### 4.2.4 Personnel Changes

Additional capabilities listed in 4.2.1 above and enhancement of security capabilities will require additional NAIMES contractor personnel resources for development, test, installation/implementation, operations and maintenance. Estimates for personnel resources required are in progress. NAIMES also provides support for the NDS program (approximately 650 terminal facilities will be fielded through 2009) and the AISR (100 terminal facilities, 21 ARTCCs, approximately 61 AFSSs, DoD facilities and others). This will require a combination of installation, help desk support, and other assistance from the NAIMES Program Office.

### 4.2.5 Environment Changes

No changes in the environment are planned or expected except the additional system (hardware, software, and configuration) required by the capabilities listed in 4.2.1.

### 4.2.6 Operational Changes

This section describes the changes users will need to make to their policies, procedures, methods, or daily work routines caused by the above changes.

- 604 Circuit users will have to migrate to AIDAP web servers and web services
- User of WMSCR need to be notified that they can obtain aeronautical information (NOTAMs) from NAIMES

## 4.3 Priorities among Changes

This section identifies priorities for essential and desired features (the optional features category was not used—all proposed changes were classified as either essential or desirable).

### 4.3.1 Essential Features

This section provides a priority listing of essential features and the impact of the change is not implemented.

- **Expansion and enhancement of external interfaces:** Failure to expand and enhance external interfaces would cause other NAS systems to rely on legacy systems as indirect sources of aeronautical data.
- **Provide NOTAM IP / NDS Services to ATCTs/TRACONs/FCTs:** Failure to implement this capability would mean AFSSs and ARTCCs have to require on manual methods (phone calls and faxes) to distribute NOTAMs to terminal facilities.
- **Expansion and enhancement of the Master NOTAM Database:** Failure to implement this feature would result in one or more incomplete NOTAM databases and would complicate interface requirements for systems requiring NOTAMs.

- **Complete enhancements at the SLC remote site:** Failure to complete the enhancements at the SLC remote site would prevent limits the FAA's ability to respond to a contingency/disaster situation at the ATCSCC.
- **Provide enhanced enterprise network management capabilities:** Failure to enhance the enterprise network management capability would limit the NAIMES program's ability to perform enterprise management of the system.
- **Implement the SPIRIT Portal Application:** Failure to implement the SPIRIT portal would limit the availability of on-demand aeronautical and flight-service data to the NAS.
- **Complete NAIL (AIXM Superset) implementation:** AIXM data types do not contain all of the data the FAA currently stores in NAIMES. Failure to complete the implementation of NAIL would preclude the delivery of AIXM compliant data to the NAS.

### 4.3.2 Desirable Features

This section provides a priority listing of essential features and why the features are desirable.

- **Implement Enhanced Graphical NOTAM Capability:** Implementing this feature would allow users to be able to see where NOTAMS are with respect to proposed flight plans and would contribute to safety of flight. Providing this information and decision assistance would help reduce pilot deviations.
- **Implement IPv6 and emerging transport technologies:** Implementation of IPv6 and other emerging transport technologies will improve the security, quality of service, and network management and facilitate migration of NAS systems from legacy systems to modern systems using current standard formats and protocols.
- **Obtain weather and aeronautical data at the source:** Implementing this capability would provide NAIMES with all products available on WMSCR and would help with the migration of systems off of WMSCR.

### 4.3.3 Optional features

Not Applicable.

## 4.4 Changes Considered but not Included

Not Applicable.

## 4.5 Assumptions and Constraints

The following assumptions applicable to the changes and features identified above:

- FAA systems and NAS users would be willing to share information
- Information will be shared between systems using standard protocols and formats and/or protocols established in Interface Requirements Documents and Interface Control Documents
- The technology and communications infrastructure would be available, will provide adequate throughput, and will minimize latency

- The technology and communications infrastructure will support information sharing and collaboration
- Aeronautical information would be virtually aggregated in a single master database
- L NOTAMs will be merged into the USNS Master Database
- Hot backup site capability will be available (no single point of failure for critical/essential products and services)
- Sufficient funding will be available for hardware and software to perform the changes
- Sufficient personnel resources with the correct skills will be available to perform the work
- Users will migrate away from legacy NADIN-based (X.25) protocols and toward TCP/IP protocols available on FTI, NIPRNET, and the Internet
- Primary and remote facilities will have adequate environmental controls and critical power

The following constraints are applicable to the changes and features identified above:

- Information sharing would require access control and data management to protect sensitive information
- The following documents impose further constraints:
  - Presidential Decision Directive 63 (PDD 63), "Protecting America's Critical Infrastructures"
  - Presidential Decision Directive 67, "Enduring Constitutional Government and Continuity of Government"
  - Title III of Public Law 107-347, The Federal Information Security Management Act (FISMA) of 2002, December 17, 2002
  - Computer Security Act of 1987
  - 44 U.S.C. Chapter 35, Coordination of Federal Information Policy
  - 49 C.F.R. Part 15, "Protection of Sensitive Security Information"
  - 49 C.F.R. Part 1520, "Protection of Sensitive Security Information"
  - Freedom of Information Act (FOIA) Amendments 5 U.S.C. 552 and 5 U.S.C. 552a
  - Computer Security Act of 1987 (Pub. Law 100-135)
  - Government Performance and Results Act (GPRA)
  - Paperwork Reduction Act (PRA) of 1995
  - Government Paperwork Elimination Act (GPEA)
  - Clinger-Cohen Act (CCA) of 1996 (also known as the Information Technology Management Reform Act)
  - Section 508 of the Workforce Investment Act of 1998
  - Public Law 100-235 Security Constraints
  - Privacy Act of 1974 and Amendments (as of Jan 2, 1991), 5 U.S.C. Sec. 552a, Title 5, Part I, Chapter 5, Subchapter II
  - General Accountability Office (GAO) "Federal Information System Control Audit Manual" (FISCAM)
  - Office of Management and Budget (OMB) Circular A-123
  - OMB Circular A-127
  - OMB Circular A-130, Management of Federal Information Resources, Appendix III, "Security of Federal Automated Information Resources,"
  - OMB Circular A-134 & Memo 05-02
  - OMB Circulars A-11 and No. A-130 (including Appendix III) security constraints
  - OMB Memorandum 99-18, "Privacy Policies on Federal Web Sites"

- OMB Memorandum 00-13, "Privacy Policies and Data Collection on Federal Web Sites"
- OMB Circular A-123, Management Accountability and Control, as amended
- National Institute of Standards and Technology (NIST) Special Publications (800 series)
- FIPS 199
- NIST Special Publication 800-14, "Generally Accepted Principles and Practices for Security Information Technology Systems"
- NIST Special Publication 800-18, "Guide for Developing Security Plans for Information Technology Systems"
- NIST Special Publication 800-53, Recommended Security Controls for Federal Information Systems
- NIST Special Publication 800-60, Guide for Mapping Types of Information and Information Systems to Security Categories
- NIST Special Publication 800-73, Interfaces for Personal Identity Verification
- FIPS 140-2
- FIPS 199, Standards for Security Categorization of Federal Information and Information Systems
- FIPS 201, Personal Identity Verification (PIV) of Federal Employees and Contractors
- NIST Special Publication 800-59, Guidelines for Identifying an Information System as a National Security System, August 2003
- NIST Special Publication 800-40, Procedures for Handling Security Patches, August 2002
- NIST Special Publication 800-60, Volumes I and II
- DoD Instruction 5200.40, DoD Information Technology Security Certification and Accreditation Process (DITSCAP)
- DOT Handbook 1350.2, Departmental Information Resources Management Manual, Information Systems Security Program, March 3, 1999
- DOT Order 1640.4, Chapter 5, For Official Use Only Information (FOUO)
- FAA Order 1280.1, Protecting Privacy of Information about Individuals
- FAA Order 1370.79A, Internet Use Policy, October 12, 1999
- FAA Order 1370.82, Information Systems Security Program, June 9, 2000
- FAA Order 1370.83, Internet Access Points, February 8, 2001
- FAA Order 1370.90, Internet Access Point Configuration Management, August 1, 2003
- FAA Order 1370.91, Information Systems Security Patch Management, May 19, 2004
- FAA Order 1370.92, Password and PIN Management, June 28, 2004
- FAA Order 1370.94, Wireless Technologies Security Policy, February 3, 2005
- FAA Order 1600.2, Safeguarding Controls and Procedures for Classified National Security Information and Sensitive Unclassified Information
- FAA Order 1600.73, Contractor and Industrial Security Program Operating Procedures
- FAA Order 1600.74, Visitor Procedures for Federal Aviation Administration Facilities
- FAA Order 1600.75, Protecting Sensitive Unclassified Information (SUI), February 1, 2005
- FAA Order 1800.66, Configuration Management Policy, December 13, 2000
- FAA Order 1800.8f National Airspace Configuration Management
- FAA Order 1800.57 National Airspace Configuration Control Board

- FAA Order 1900.1, FAA Emergency Operations Plan, December 31, 2001
- FAA Order 7110.10 Flight Services, Feb 19, 2004
- FAA Order 7930.2, Notices to Airmen (NOTAMS), Feb 19, 2004
- FAA Human Resources Policy Manual, ER 4-1, Standards of Conduct
- FAA Telecommuting Handbook of May 1997
- FAA Standard 025, Preparation of Interface Documentation
- FAA Standard 039, National Airspace System (NAS) Open Systems Architecture and Protocols
- FAA Standard 042, National Airspace System (NAS) Open Systems Interconnection (OSI) Naming and Addressing
- FAA Standard 043, National Airspace System (NAS) Open Systems Interconnection (OSI) Priority
- FAA Standard 044, National Airspace System (NAS) Open Systems Interconnection (OSI) Directory Services
- Open Systems Interconnection Security Architecture, Protocols and Mechanisms
- FAA Standard 047, National Airspace System (NAS) Open Systems Interconnection (OSI) Conformance Testing
- FAA Standard 048, National Airspace System (NAS) Open Systems Interconnection (OSI) Interoperability Standard
- NAS-SR-1000, NAS System Requirements Specification
- FAA Aeronautical Information Manual, Feb 19, 2004
- FAA Notices to Airmen Publication
- NAIMES Level 3 Security Certification and Authorization Package, August 12, 2005
- FAA ISS Handbook, Version 3
- National Institute of Standards and Technology (NIST) Special Publication 800-34, Contingency Planning Guide for Information Technology Systems
- NAS Aeronautical Information Management Enterprise System (NAIMES) System Characterization, July 29, 2005
- NAS Aeronautical Information Management Enterprise System (NAIMES) Information System Security Plan, July 29, 2005
- FAA Order 1370.82, Information System Security Program, June 9, 2000
- Department of Transportation (DOT) Handbook 1350.2, Departmental Information Resource Management Manual (DIRMM),
- NIST Special Publication 800-34, Contingency Planning Guide for Information Technology Systems, June 2002
- The Computer Security Act of 1987
- Office of Management and Budget (OMB) Circular A-130, Management of Federal Information Resources, Appendix III, November 2000
- Federal Preparedness Circular (FPC) 65, Federal Executive Branch Continuity of Operations, July 1999
- Presidential Decision Directive (PDD) 67, Enduring Constitutional Government and Continuity of Government Operations, October 1998
- PDD 63, Critical Infrastructure Protection, May 1998
- Federal Emergency Management Agency (FEMA) Federal Response Plan (FRP), April 1999

# 5 CONCEPTS FOR THE PROPOSED SYSTEM

This section describes the proposed system that results from the desired changes specified in Section 4. The operational features of the proposed system are described in a high-level manner without specifying design details.

The future vision of NAS operations supports effective collaboration among all participants, provides flexibility in assigning airspace and infrastructure resources, automates the establishment and teardown of communications connections between NAS systems to support NAS operations, and offers increased NAS information security.

NAIMES will provide reliable and consistent aeronautical information delivery by:

- Providing support to new systems using the latest protocols and standards
- Providing support to legacy systems and protocols
- Providing protocol conversion services to allow legacy systems to interface with new systems
- Providing a migration path for existing systems to migrate away from legacy system
- Providing support for delivery of static and dynamic aeronautical information
- Delivering accurate aeronautical information in a near-real-time manner
- Providing support for a wide variety of data types
- Providing support for delivery of information to multiple users
- Providing authentication of users and controlled access to NAS information (security)
- Means for users to search for and request desired information
- Provide redundant systems and a hot backup site to prevent a single point of failure
- Provide scaleable, standards based solutions

NAIMES is never intended to be at an end-state. Rather, NAIMES will evolve using spiral development as new requirements are levied and as new capabilities, techniques, and technologies become available. The NAIMES strategic goal is to achieve a safer, more flexible, reliable, and accessible NAS environment. NAIMES support and services will be supplied to users and systems in accordance with FAA policies and orders based upon the users' and systems' capabilities. NAIMES can provide legacy system support, tailored web services to systems, and can provide customized applications web-based support with tailored web pages to meet the users' and systems' needs. Data sources will continue to be integrated so that users can find aeronautical data from a single source. NAIMES will use open systems technology to allow easier data integration, data exchange, and flexibility to change. This will allow NAIMES to use the most current technology to distribute data efficiently and accurately, eventually making single-source real-time data available to all involved in maintaining the safety of the NAS.

## 5.1 Background, Objectives, and Scope

The background, objectives, and scope of NAIMES are described in Section 3.1. The enhancements to NAIMES products and services are primarily driven by new user needs and to take advantage of evolving technologies. NAIMES will provide continue to support for legacy systems and support the migration of systems relaying on legacy systems and services to newer technologies. NAIMES will also work with its customers to tailor its products and services to their operational and business needs.

## 5.2 Operational Policies and Constraints

The operational policies and constraints for NAIMES are shown in section 5.2 and these also apply to the enhancements to NAIMES.

## 5.3 Description of the Proposed System

The current NAIMES systems are described in section 3.3 and most of section 3.3 still applies to the future NAIMES products and services. This section will describe the effect of the new enhancements to NAIMES.

#### 5.3.1.1 SLC NAIMES Remote Site

The NAIMES Contingency/Disaster Recovery Plan (C/DRP) identifies recovery goals, actions, and points of contact (POCs) for service restoration following a major system outage or an emergency contingency. The scope of this C/DRP includes approaches to restoral of disrupted IT services by either recovering operations at the ATCSCC or restoring limited operations at an alternate site. Due to the volume of message traffic NAIMES handles, it would not be feasible to fall back to manual methods of processing NAIMES data.

- Geodiversity. Critical components of NAIMES are replicated at the SLC remote site. The SLC site will provide continuity of core NAIMES services in the event of a catastrophic failure at the primary site. The SLC site has Master, FTI, Internet, and NIPRNET subsystems and possesses NADIN connectivity.
- Redundancy. The ATCSCC NAIMES site has redundancy built into virtually all system components. Production servers, web servers, databases and network communications on all ATCSCC NAIMES subsystems use redundant systems to prevent a single point of failure for equipment outages such as the failure of a single server, router, database, switch, firewall, etc.
- Replication. NAIMES uses replication to synchronize the data on the ATCSCC subsystems and the SLC subsystems. This ensures the availability, currency, and accuracy of the data.

In the event of a contingency or disaster recovery scenario, NAIMES has checklists in the C/DRP and as part of their systems Standard Operating Procedures to follow in responding to the incident. In addition, NAIMES has established a priority of restoral for services. The high-level activities that are followed to respond to these scenarios include:

- Emergency Response
- Detection and Analysis
- Notification

- Backup Operations
- Reporting
- Data Collection
- Recovery Operations
- Post-recovery Analysis

#### 5.3.1.2 NAS Gateway

The NAS Gateway is a NAIMES service that provides a bridge for new systems to communicate with legacy systems. The NAS Gateway provides this service using protocol conversion and protocol encapsulation/tunneling. The NAS Gateway provides legacy NADIN II connectivity and will continue to expand to provide Airlines, DoD, internal NAS users, and other authorized users with access to critical aeronautical data, weather, and flight movement messages required for operations within the NAS.

The NAS Gateway infrastructure will include interfaces with Quality of Service (QoS) to the following networks:

- Internet
- FIRMNet
- BWM
- FTI
- FTI Administrative Network
- NIPRNET
- NADIN I
- NADIN II

The NAS Gateway will include interfaces to the following systems:

- TCP/IP – NIPRNET, FIRMNet, FTI Administrative Network, Internet
- X.25 – NADIN II PSN, NADIN, WMSCR
- M1FC, OASIS, ERIDS, ERAM, SAIDS4, MILOPS

The NAS Gateway will provide the following additional services:

- NAS NIC
  - TCP/IP (IPv4) Address Assignments
  - TCP/IP (IPv6) Address Assignments
  - FTI NAS DNS Services
- X.25 –TCP/IP Protocol Conversion/Encapsulation

#### 5.3.1.3 NAIL

AIXM and the related AICM are used for neutral aeronautical data interchange between computer systems. AICM and AIXM were originally developed by EUROCONTROL to standardize the exchange of data products within the European States. AICM and AIXM are being adopted internationally, and as a result, FAA/NAS systems will increasingly be migrating to this standard of data exchange. AIXM utilizes XML for data exchange. XML is a simple, very flexible text

format. Originally designed for electronic publishing, XML is now being utilized to exchange data on the Web and elsewhere.

NAIMES currently distributes weather, NOTAMs, and NAS fixed asset data utilizing XML on both the FAA intranet and via the Internet to external customers, including airlines and other commercial data providers. DoD accesses NOTAMs data via an XML feed in NIPRNET.

NAIMES has also developed a NAS/DoD-specific version of AIXM known as the NAS Aeronautical Information Language (NAIL). The NAIL is a superset of AIXM, which includes flight-plan specific extensions, not currently part of AIXM. NAIL version 0.11 has been developed, and is implemented in version 1.0 of FlightAssist. A prototyping activity is scheduled in FY06 to lay the groundwork for the implementation of an AIXM compliant version NASR data.

#### 5.3.1.4 FlightAssist

As mentioned in Section 3.3.9, FlightAssist is a PC-based flight planning application designed for FAA and DoD and is based on the commercial Golden Eagle FlightPrep product which was developed to provide online flight planning capabilities. FlightAssist will save flight plan data utilizing XML (AIXM/NAIL) and will have features such as weather overlays, current TFRs, and topographic and flight planning charts. FlightAssist allows users to flight plans, flight charts, weather charts, and print flight logs. In the future, FlightAssist will also have the capability to export flight plans directly into NAIMES.

#### 5.3.1.5 Local NOTAMs

One of the major limitations of the collection and distribution of NOTAMs within the NAS involves L NOTAMs. There are procedural and capacity limitations with Flight Service Automation Systems (FSAS) (M1FC's FSDPS and OASIS) that currently prevent the NAS from including L NOTAMs into USNS. AFSSs equipped with OASIS and AISR currently have the capability to transmit and receive L NOTAMs while USNS and the Master NOTAM Database have the capacity to ingest, process, store, and distribute L NOTAMs. Since USNS has the infrastructure and procedures established to collect, process, validate, store, distribute, and track receipt acknowledgement of other NOTAMs, it would be the logical and most cost effective choice for maintaining the National L NOTAM database.

#### 5.3.1.6 Joint Mission Planning (JMPS) Interface

JMPS joint development effort between the Navy and the Air Force to create the next generation mission planning system to support the DoD's joint mission planning needs. The JMPS mission is to support the DoD war fighters today and to support the DoD's Joint Vision 2010. The principle objectives of JMPS are to create a scaleable framework for mission planning systems and promote collaborative inter-service mission planning. JMPS will be Defense Information Infrastructure Common Operating Environment (DII COE); Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR); and Joint Technical Architecture (JTA) compliant. JMPS will have reduced life-cycle costs, capability equal to or better than legacy systems, and will provide a smooth migration from legacy systems such as Portable Flight Planning Software (PFPS), Air Force Mission Support System (AFMSS), and Tactical Aircraft Mission Planning System (TAMPS).

#### 5.3.1.7 FS-21 Interface

NAIMES is working with the FS-21 Program Office to provide access to aeronautical information and NAS Gateway services. The NAIMES NAS Gateway provides access to the NADIN Gateway function and to the NAS Data Mirror. The NADIN Gateway provides two-way message transfer services between the NADIN SVC-B network (NADIN I/ NADIN II) and FS-21. The NAS Data Mirror provides secure FTP (SFTP) access to NAS data including NASR and NACO.

NAIMES provides access to the following products and services to FS-21:

- NOTAMs
- Digital Aeronautical Information (DAI) – Digital Aeronautical Chart Supplement (DACS)
- National Flight Database (NFD)
- Digital Terminal Procedure Publication (d-TPP)
- Sectional Raster Aeronautical Charts (SRAC) – Alaska, East, and West
- NASR
- SUA

#### 5.3.1.8 Enterprise Architecture Single Sign-on Service

Users typically have to sign-on to multiple systems, necessitating an equivalent number of sign-on dialogues, each of which may involve different user names and authentication information. System administrators are faced with managing user accounts within each of the multiple systems to be accessed in a coordinated manner in order to maintain the integrity of security policy enforcement. Single sign-on is mechanism whereby a single action of user authentication and authorization can permit a user to access all resources (computers, systems, services, files, etc.) where the user has access permission, without the need to enter multiple user IDs and passwords. Single sign-on reduces human error and is highly desirable to implement. From a management perspective the single sign-on model provides a single user account management interface through which all the component domains may be managed in a coordinated and synchronized manner.

The benefits of enterprise single sign-on include:

- Reduction in the time taken by users in sign-on operations to individual domains, including reducing the possibility of such sign-on operations failing
- Improved security through the reduced need for a user to handle and remember multiple sets of authentication information
- Reduction in the time taken, and improved response, by system administrators in adding and removing users to the system or modifying their access rights
- Improved security through the enhanced ability of system administrators to maintain the integrity of user account configuration including the ability to inhibit or remove an individual user's access to all system resources in a coordinated and consistent manner

NAIMES is already using single sign-on identification/authentication to selected resources using Windows 2003 Server Domain Controllers and will expand the capability to include AISR, NES, DINS, and NDS.

#### 5.3.1.9 IPv6 Transition

Internet Protocol Version 6 (IPv6) is the next generation protocol designed by the Internet Engineering Task Force (IETF) to replace the current version Internet Protocol, IP Version 4 (IPv4). IPv6 fixes a number of problems in IPv4, such as the limited number of available IPv4 addresses. It also adds improvements to IPv4 in areas such as routing and network auto configuration, improved protocols, and quality of service. IPv6 is expected to gradually replace IPv4, with the two coexisting for a number of years during the transition period.

The main features of IPv6 are:

- New header format
- Large address space
- Efficient and hierarchical addressing and routing infrastructure
- Stateless and stateful address configuration
- Built-in security
- Better support for QoS
- New protocol for neighboring node interaction
- Extensibility

One of the biggest challenges in the deployment of IPv6 is how to migrate IPv4-based infrastructures to those supporting IPv6. It is impractical and costly to completely replace the existing IPv4-based networking infrastructures with IPv6—a more practical approach is to transition from IPv4 to IPv4/IPv6 co-existence and then to transition to IPv6.

To ensure a smooth and successful integration of IPv6 into existing networks, NAIMES is researching several transition strategies. These include:

- 6-over-4 Mechanism (host to host tunneling)
- IPv6 in IPv4 tunneling (router to router tunneling)

The router-to-router tunneling enables two entire LANs to be upgraded to IPv6 while maintaining connectivity to the rest of the Internet. Encapsulation of IPv6 packets within IPv4 packets allows two IPv6 hosts/networks to be connected with each other while running on existing IPv4 networks. IPv6 packets are encapsulated in IPv4 packets and then are transmitted over IPv4 networks like ordinary IPv4 packets. At the destination, these packets are de-capsulated to the original IPv6 packets.

Host-to-host encapsulates and decapsulates the IPv6 within IPv4 so the local LAN is unaware that it is carrying IPv6 traffic. Because of its simplicity of implementation, host-to-host encapsulation offers another method of making the transition from IPv4 to IPv6 as smooth as possible.

NAIMES will begin offering products and services using IPv6 work while still supporting IPv4 and legacy systems. NAIMES will work with the FTI Program Office and users to ensure their needs are met.

#### 5.3.1.10 FTI DNS

NAIMES will be implementing high-availability DNS services for the FTI operational network. NAIMES is planning on implementing intelligent traffic management, load-balancing DNS Controllers to manage IP applications/services running across multiple data centers. The load balancing DNS servers distribute end user requests according to business policies, data center conditions and network conditions such as round trip time, packet loss and other QoS metrics thereby ensuring the highest possible availability for NAS services. The key benefits of these services are:

- High Availability
  - Enables transparent delivery of IP applications and Web services across multiple sites
  - Removes all single points of failure and provides transparent distribution of all IP services
  - Ensures continuity and application availability
  - Provides a comprehensive solution for site failover and business continuity--organizations can define the conditions for shifting all traffic to a backup data center, failing over their entire site, or controlling only those affected applications
- Improved Performance
  - Improves performance by directing users to the best site
  - Production rules for dynamic configuration changes to match traffic demands
  - Bandwidth Scalability
  - Supports link load balancing for all TCP, UDP, and other IP-based traffic
  - Traffic Prioritization: QoS and Type of Service (ToS)
  - Increases the efficiency, scalability and Return on Investment (ROI) by leveraging all available site resources
- Enhanced Security
  - Integrated security layer to protect against Denial of Service (DoS), Synchronization (SYN) floods, and other common site attacks
  - Secure Web Administration
  - Secure Web-Based DNS
  - Secure Network Address Translation (SNAT)

#### 5.3.1.11 Adaptive Enterprise Network Management

NAIMES is enhancing its existing enterprise network management through the use of several tools to manage its IT and telecommunications resources, to troubleshoot problems, adapt quickly to change, and keep its data and system secure. Use of these tools will increase NAIMES efficiency, provide better application availability, and optimize service/product delivery.

The tools NAIMES is implementing as part of its adaptive enterprise management and the features of the tools include:

- Hewlett-Packard (HP) Openview
  - Application, infrastructure, business, and configuration management
  - Security risk
  - Enterprise operation
  - Fault management
  - Performance monitoring
- Patchlink
  - Application version and patch management
- Skybox View
  - Automated Enterprise Risk Measurement and Management
  - Enterprise Engineering, Modeling, and Design
- Arcsight Enterprise Security Manager
  - Enterprise Security Management
- Additional Intrusion Detection Systems
- Tripwire Integrity Monitoring System
- Load Balancing DNS Servers

The purpose of these tools is to ensure high availability, fault tolerant, and low-risk operation of the NAIMES IT environment so NAIMES users can communicate rapidly and securely and enterprise network management is performed efficiently and securely.

## 5.4 Modes of Operation for the Proposed System

This section describes the two major modes of operation for NAIMES—operational and emergency backup. NAIMES applications and functions are shown as follows:

| APPLICATION/FUNCTION | PRIMARY SITE (ATCSCC*) | REMOTE SITE (SLC*) |
|---|---|---|
| USNS & Master Database | X | X |
| NOTAM IP / NOTAM Data Distribution (NDS) (to Air Traffic Control Towers (ATCTs), Federal Contract Towers (FCTs), and Terminal Radar Approach Control (TRACON) facilities) | X | X |
| NOTAM Entry System (NES) | X | X |
| Graphical Temporary Flight Restrictions (GTFR)/ Special Use Airspace (SUA) | X | X |
| Defense Internet NOTAM Service (DINS) | X | X |
| National Operational Data Archive | X | |

| APPLICATION/FUNCTION | PRIMARY SITE (ATCSCC*) | REMOTE SITE (SLC*) |
|---|---|---|
| (NODA) & Database Master | | |
| Aeronautical Information System Replacement (AISR) | X | X |
| ATCSCC Domestic Web System (Aeronautical Information Distribution/Portal) | X | X |
| PilotWeb (General Aviation Website) | X | X |
| Central Altitude Reservation Function (CARF) | X | TBD |
| Capstone/Wide Area Augmentation System (WAAS) (System Availability – Alaska and NAS-wide) | X | TBD |
| Global Positioning System (GPS) Outages (USNS and DINS) | X | TBD |
| Aeronautical Integrated Data Access Portal (AIDAP) (604 Circuit Replacement) | X | X |
| NAS Resources (NASR/eNASR) | FAA HQ | TBD |
| NAS Network Information Center (NIC) | X | |
| NAIMES Technical Support Help Desk | X | X |
| United States NOTAM Office (USNOF) Support | X | X |
| NAS Domain Name System (DNS) (to be added) | X | X |
| CDM | X | X |
| XML Interfaces | X | X |
| IPv6 Implementation | X | X |
| NAS Gateway | X | X |
| FlightAssist | X | X |
| Local NOTAMs | X | X |
| JMPS Interface | X | |
| Enterprise Architecture Single Sign-on Service | X | X |
| SPIRIT | X | X |
| Enhanced Graphical NOTAMs | X | X |

* Unless otherwise indicated

**Table 3. Proposed System Modes of Operation**

## 5.5 User Classes and other Involved Personnel

### 5.5.1 Organizational Structure

See Section 3.5.1.

### 5.5.2 Profiles of User Classes

See Section 3.5.2.

### 5.5.3 Interactions among User Classes

See Section 3.5.3.

### 5.5.4 Other Involved Personnel

See Section 3.5.4.

## 5.6 Support Environment

See Section 3.6.

# 6 OPERATIONAL SCENARIOS

## 6.1 NAIMES Management and Operation of Resources at ATCSCC and SLC

NAIMES is managed by the NAIMES Program Manager, System Operations Services. Program management support is provided to the NAIMES Program Manager by additional FAA personnel and contractor personnel. ATCSCC NAIMES operations, SLC remote site operations, and NAIMES Technical Support Help Desk support is also provided by contractors.

NAIMES program management activities include the following activities:

- Lifecycle acquisition management
- Mission needs analysis
- System engineering
- Budget preparation/management
- Procurement
- Contracting support
- Configuration management
- Security
- Risk management
- Document preparation
- Management and oversight of NAIMES Operations

ATCSCC NAIMES and SLC Remote Site Operations activities include the following:

- Day-to-day management and oversight of operations
- Support to the NAIMES Program Manager
- System engineering support
- Development
- Testing
- Installation
- Security
- System and network monitoring, operations, and maintenance

The Technical Support Help Desk activities at the ATCSCC include:

- 24 x 7 technical support for all NAIMES customers
- System monitoring

## 6.2 NAIMES System and Network Architecture at the ATCSCC and SLC Sites

Figures 6 and 7 show the high-level perspective of the NAIMES system and network architecture at the primary and remote site. NAIMES has four subsystems at each site: the Master subsystem, the FIRMNet/FTI subsystem, the Internet subsystem and the NIPRNET subsystem. The subsystems will be described in greater detail for the ATCSCC. The SLC remote site will have similar capabilities to the primary site for the core NAIMES products and services.

The NAIMES Master subsystem consists of the master production servers and master databases for NAIMES and a separate LAN used by NAIMES personnel for network/system administration and operations. The NAIMES master production servers and master databases are contained within a protected internal network segment to prevent any direct access to these resources by untrusted or semi-trusted external users or systems. The master production servers and master databases use clustering technology and redundancy to maintain high availability. The network infrastructure also uses redundancy for high availability. The Master subsystem has interfaces with NADIN, the remote site, and the other ATCSCC NAIMES subsystems (FTI/FIRMNet, Internet, and NIPRNET). The applicable databases in the Master Subsystem are replicated to database systems in the other three ATCSCC NAIMES subsystems and to the SLC remote site (core databases) for tailored processing and presentation to the users.

The ATCSCC FTI/FIRMNet subsystem consists of a DMZ containing production servers and databases to provide products and services to FIRMNet, BWM, and FTI customers. The databases in the ATCSCC subsystem are replicated to the FTI/FIRMNet subsystem. The production servers and databases in the DMZ have tailored business rules to ensure the needs of the FIRMNet, BWM, and FTI users and systems are met. The ATCSCC FIRMNet subsystem interfaces with the Master Subsystem and the FTI/FIRMNet network. The NAS NIC and NAS DNS services are also in this subsystem. The FTI/FIRMNet subsystem uses redundant servers, databases, and telecommunications to ensure high availability.

The ATCSCC Internet subsystems consists of a DMZ containing production servers and databases to provide products and services to Internet and FTI Administrative network users. The databases in the ATCSCC subsystem are replicated to the Internet subsystem. The production servers and databases in the DMZ have tailored business rules to ensure the needs of the Internet and administrative network users and systems are met. The ATCSCC Internet subsystem interfaces with the Master Subsystem, the Internet network, and the FTI Administrative Network. This system is known as the NAS IAP. The Internet subsystem uses redundant servers, databases, and telecommunications to ensure high availability.

The ATCSCC NIPRNET subsystem consists of a DMZ containing production servers and databases to provide products and services to NIPRNET users. The databases in the ATCSCC subsystem are replicated to the NIPRNET subsystem. The production servers and databases in the DMZ have tailored business rules to ensure the needs of the NIPRNET users and systems are met. The ATCSCC NIPRNET subsystem interfaces with the Master Subsystem and the NIPRNET. The

NIPRNET subsystem uses redundant servers, databases, and telecommunications to ensure high availability.

The SLC remote site operates in a similar manner to the ATCSCC system. Databases in the ATCSCC Master are replicated to the SLC site and then they are replicated to the SLC subsystems. NAIMES uses similar hardware and reuses software throughout it subsystems to keep development costs down.

## 6.3 NAIMES Systems and Services

This section describes the NAIMES systems and services operational scenarios in greater detail.

### 6.3.1 NAS/DoD Program Infrastructure and Services

#### 6.3.1.1 NAS QICP IAP

The NAS QICP IAP is the only authorized NAS Internet Access Point in the FAA. This IAP contains servers that offer web pages, XML services, and other interfaces for customers. Some of the web pages and services offered require identification and authorization prior to grating access. Some of the services also require the use of certificates. The IAP also serves as the ISP providing operational services for NAIMES, ETMS, DUATS, the ATCSCC, etc.

#### 6.3.1.2 NAS DNS and NAS NIC

NAIMES operates DNS servers within each NAIMES subsystem to allow both internal and external users to use URLs to reach accessible NAIMES servers and hosts using mnemonic strings instead of dotted decimal notation IP addresses. In addition, NAIMES serves as the root DNS for all NAS systems on FIRMNet, BWM, and FTI.

NAIMES also operates the NAS Network Information Center and assigns/registers host computers names and assigns IP addresses for NAS systems. The NAS NIC provides information and services that are mission critical to the operation of the NAS. The NAS NIC:

- Operates the NAS.FAA.GOV (and other NAS Domains/Sub-Domains)
- NAS DNS Domains Registry
- Operates the NAS IP Assigned Numbers Registry
- Coordinates actions regarding security incidents and network vulnerabilities
- Operates World Wide Web (WWW) and database servers for NAS NIC, NOTAMs, NASR, and other NAS programs
- Issues Network Management Bulletins and other announcements
- Provides NIC-related support assistance

#### 6.3.1.3 NAIMES Technical Support Help Desk

The NAIMES Technical Support Help Desk operates 24 x 7 to provide a single point of contact and technical assistance to NAIMES customers. The Help Desk also monitors NAIMES systems performance to ensure the system is functioning properly and to ensure system availability. The Technical Support Help Desk will log all incoming requests and work to resolve any issues. If required, the Help Desk will contact the appropriate NAIMES personnel to resolve issues that require additional work.

### 6.3.2 Systems and Services

#### 6.3.2.1 USNS & Master Database

USNS and the Master NOTAM Database provide the core services for NAIMES NOTAM processing. Within the NAS, many aeronautical publications and charts establish what may be taken as the baseline for aeronautical information (reference data and flight procedures) and much of this information is from NASR or derived from NASR. Whenever the baseline is revised, changed, corrected, new information is added, or whenever a new condition occurs that impacts the baseline, it becomes necessary to inform users of changes. If the change or new condition is know in advance, the aeronautical publications and/or charts can be changed in advance or the change can be published in the Notices to Airmen Publication. If an unexpected change occurs that can be published in the aeronautical publications, charts, or Notices to Airmen Publication, one or more NOTAM messages will need to be issued. NAS users need to consult all of these sources to ensure they are aware of conditions in the NAS.

##### 6.3.2.1.1 NOTAM Types

This section describes many of the different types of NOTAMs used within the NAS. Consult FAA Order 7930.2 of applicable ICAO or International publications for more information. NOTAMs consist of the following types:

- Domestic (D) NOTAMs. These NOTAMs are issues through AFSSs and FSSs and are safety–critical notices that apply to facilities, equipment, or airfields such as the outage of a NAVAID. The condition that causes a D NOTAM may also require an FDC NOTAM to be issued.
- FDC NOTAMs. These NOTAMs are typically issued by ARTCCs or the NFDC. FDC NOTAMs are NOTAMs that apply to procedures. As an example, if a Instrument Landing System (ILS) (NAVAID) outage requires a D NOTAM to be issued, it may also require an FDC NOTAM if the outage also alters the approach procedures. Other types of FDC NOTAMs include:
    - TFRs. A TFR is a temporary flight restriction. A TFR would be issued for activities such as forest fires where a large volume of airspace might be restricted.
    - Presidential and Security TFRs. A Presidential of Security TFR would be issued whenever flying would need to be restricted in a particular area
- Local NOTAMs. Local NOTAMs are NOTAMs that meet L NOTAM criteria as established in FAA Order 7930.2.
- Military NOTAMs. Military NOTAMs are NOTAMs that are issued by the US Military.
- ICAO. An ICAO NOTAM is a NOTAM in the ICAO format. Within USNS, all NOTAMs are stored in the ICAO format.

##### 6.3.2.1.2 NOTAM Sources

This section describes the sources of NOTAM messages by NOTAM type. In general, any person may propose a raw or candidate NOTAM but only authorized persons may submit one. A raw or candidate NOTAM is an unnumbered NOTAM. After a candidate NOTAM is numbered, it becomes an actual NOTAM.

- Domestic (D) NOTAMs. The source of a candidate D NOTAM may be an Airfield Manager, an AF Specialist, a Flight Check organization, an FSS Specialist, etc. These

candidate NOTAMs are normally input by FSS Specialists using M1FC, OASIS, FS-21, and AISR. Candidate D NOTAMs are sent to USNS/USNOF where validity checks are performed. Candidate NOTAMs that don't pass the validity checks are returned to the originator. Candidate NOTAMs that pass the checks are then entered into USNS for processing, storage, and dissemination.

- FDC NOTAMs. The source of candidate FDC NOTAMs may be an ARTCC, the NFDC, the FSOSC, the Presidential and Security NOTAM office, Flight Check, the US Forestry Service, etc. These candidate FDC NOTAMs may be entered using the web-based NOTAM Entry System or they may be faxed or called to the NFDC who will provide them to the USNOF. Candidate NOTAMS are sent to USNS/USNOF where validity checks are performed. The USNOF will work with candidate NOTAMs that don't pass the validity checks by checking with the originator to correct any deficiencies with the NOTAM. Candidate NOTAMs that pass the checks are then entered into USNS for processing and distribution.
- Local (L) NOTAMs. L NOTAMs are handled similar to D NOTAMs except they are only transmitted to the FSDPS (and no higher—meaning not to USNS) for M1FC equipped AFSSs or they are kept within the originating AFSS for OASIS-equipped AFSSs. It is anticipated that FS-21 will overcome this limitation and that L NOTAMs will be forwarded to USNS.
- Military NOTAMs. Candidate Military NOTAMs are entered by Base Operations Personnel using the web-based DINS system. In order to use DINS for NOTAM input, certificates are required.
- ICAO. ICAO NOTAMs are received from International NOTAM offices. Some ICAO NOTAMs from Canada and Mexico are reissued as US Domestic NOTAMs so they may be processed by M1FC.

#### 6.3.2.1.3 Data Processing, Validation, On-line Storage, and Archival

When candidate NOTAMs are received at the USNS, the candidate NOTAMs are processed by the Beehive server monitored by the USNOF. If the NOTAM fails the validity checks, the NOTAM is either returned to the originator with a code (for D NOTAMs) or is worked by the USNOF to fix problems--DINS performs this function for Military NOTAMs. If the candidate NOTAM passes the validity checks, the USNOF accepts the NOTAM and it gets a number and is sent to USNS for storage and distribution. USNS will forward the NOTAM to the appropriate system or portal (WMSCR, NOTAM IP, AISR, DINS, NDS, AIDAP, etc.) for further distribution. NOTAMs and NOTAM audit logs are also stored for 45 days for retrieval for event reconstruction purposes. NOTAMs are also archived into NODA for long-term archival.

### 6.3.2.2 NASR/eNASR

NASR/eNASR supports the day-to-day management of NAS information used by the FAA to produce various aeronautical publications. NASR/eNASR products are vital for NAS users. It can be considered to be the baseline of the resources and reference data in the NAS. The data includes airports, runways, navigational aids, instrument landing systems, fixes, airways, military training routes, and towers. Information on the fixed assets of the NAS is stored in the system's relational database. The NASR/eNASR Production Environment employs a client/server architecture at FAA HQ for NFDC and J2EE web-services architecture for the eNASR DMZ to service external users.

Approximately 25 NFDC workstations are connected to the production server. A replicated set of NASR data is located at the ATCSCC in order to support NAS operational systems.

NASR/eNASR components include COTS DBMS and Middle-Tier components, GIS tools, and report generation tools. The system performs the following functions: input, display, storage, transmission, and receipt of aeronautical information. The eNASR provides a remote interface using XML to provide web services for the receipt of remote inputs and for the retrieval of data through browser and API interfaces. eNASR will provide support for aeronautical data interchange in the NAS using AIXM protocols.

Some of the customers for the NASR system are the National Aeronautical Charting Office (NACO), National Oceanic and Atmospheric Administration (NOAA), William J. Hughes Technical Center (WJHTC), National Geospatial-Intelligence Agency, the Aerospace Center, and the Jeppesen/Sanderson Company. It is estimated that there are over 500 subscribers for NASR data or products or services. NASR products are used by the En Route Host, M1FC, AISR, USNS, OE/AAA, AVN, and NGA.

#### 6.3.2.3 Data Access Portals

##### *6.3.2.3.1 AISR*

AISR support general aviation and military users by allowing them to file flight plans and to obtain weather data, NOTAMs, PIREPs, and other aeronautical data. AISR provides services over the NIPRNET for military users, over FTI for FAA internal users, and over the FAA Administrative LAN and Internet for other authorized users. Access to the NIPRNET for military users allowed considerable cost savings to the FAA. In the past, the FAA had to pay for 220 leased circuits that provided access from the MBO facilities to the AIS servers located at the ATCSCC. According to the draft AISR Strategy Paper dated December 2001, cost benefits include $8-10M over the life of the contract.

Military users have the capability to consolidate NOTAMs and flight-planning functions within a single AISR workstation. However, at the current time, military AISR workstations are being used for flight planning functions and the military uses DINS to process NOTAMs.

Within the FAA, AISR is currently installed in all 61 FSSs, in all ARTCCs and in approximately 100 ATCTs. At AFSSs, AISR is used as a back-up to OASIS or M1FC to enter and receive NOTAMs.

##### *6.3.2.3.2 PilotWeb*

PilotWeb provides access to current NOTAM information derived from the United States USNS at the ATCSCC. PilotWeb incorporates many features to assist the user when retrieving NOTAM requests. Real-time NOTAM data is available, and contains all NOTAMs validated by USNS, which includes domestic, international, military and from NFDC. PilotWeb provides filtering capability to allow users to display only those NOTAMs that they need.

PilotWeb allows users to request NOTAM information in either Raw Text or Report Text format. Raw Text is the international machine readable ICAO format with multiple report fields, NOTAM

series, and NOTAM numbers displayed. Report Text is the translated NOTAM summary format which users find desirable. Report Text format will also insert a blank line between each NOTAM to improve their readability.

#### *6.3.2.3.3 Aeronautical Integrated Data Access Portal (AIDAP) (604 Circuit Replacement)*

AIDAP provides a service to former users of the low speed, 604 Circuit. The 604 Circuit was a one-way, 1200 baud, multi-point circuit established in the early 1970's as a supplement to two-way teletype circuits. AIDAP provides comparable NOTAMs and weather products over the web to authorized users, who must first perform an authenticated log-in. The former Air Traffic Procedures Division, ATP-300, researched the retirement of the 604 Circuit with a small amount of current users (estimated at 25) in the 2nd quarter of FY2004. Based on the response, which did express interest in continuation of this data source though the Internet, NAIMES proceeded with AIDAP development. These users are currently listed as industry related vendors including Jeppesen, UNISYS, WSI, as well as airline operations centers such as UPS and FEDEX. The weather products available via AIDAP are limited to what was transmitted on the 604 Circuit. In contrast to the low-speed stream of unfiltered, time delayed data on the 604 Circuit, AIDAP allows users to retrieve NOTAMs using search criteria, and weather products can be retrieved for up to the preceding 72 hours.

#### *6.3.2.3.4 NAS Gateway*

The NAIMES NAS Gateway is implemented at the primary and remote NAIMES sites. The primary site includes redundant servers and communication equipment to maintain availability requirements.

The NAIMES NAS Gateway provides access to the NADIN Gateway function which allows systems two-way message transfer services between the NADIN SVC-B network (NADIN 1/ NADIN 2) and users/systems on FTI/FIRMNet.

For example, a client system on FTI would initiate a connection with the NAS Gateway. After the NAS Gateway accepts the connection, the client would send a properly formatted message to the NAS Gateway using TCP. The NAS Gateway would remove the TCP/IP protocol information and wrap the message in NADIN protocols and send the message on NADIN. For communication from NADIN back to the client on FTI, the reverse would happen. The Gateway would receive a message wrapped in the NADIN protocols, it would remove the NADIN protocol and replace it with the TCP protocol wrapper and transmit it back to the originating client on FTI.

It should be noted that the systems (FTI and NADIN addresses) involved in the NAS Gateway message transfer must be known in advance and the messages transferred must be in the proper format. If the addresses do not match a list of known originators, the messages will be discarded

# 7 SUMMARY OF IMPACTS

This section describes the operational impacts of the proposed system on the users, the developers, and the support and maintenance organizations. It also describes the temporary impacts on users, buyers, developers, and the support and maintenance organizations during the period of time when the new system is being developed, installed, or while training is being conducted. This information is provided in order to allow all affected organizations to prepare for the changes that

will be brought about by the new system and to allow for planning of the impacts on the buyer agency or agencies, user groups, and the support maintenance organizations during the development of, and transition to the new system.

## 7.1 Operational Impacts

This section describes the anticipated operational impacts on the user, development, operational support, and maintenance agencies during operation of the proposed system.

NAIMES uses the spiral development process to field capabilities and can react quickly to user's needs. The operational impacts of NAIMES on users is more likely than not that NAIMES facilitates and/or enables users of its services to do their work more efficiently than they would be able to do without NAIMES.

### 7.1.1 System Downtime

NAIMES products and services are safety-critical and mission essential for the NAS and mission critical for DoD. As previously discussed, the NAIMES goal for system availability is 99.975%--this goal is to ensure system availability for users and other NAS systems. NAIMES develops and tests its products in a test environment to prevent possible impact to the operational system. NAIMES also schedules upgrades at off-peak hours and makes every effort to minimize service disruption to its users. The impact of the availability requirement is to the development, support, and maintenance agencies.

### 7.1.2 New Interfaces

NAIMES is continuously developing new interfaces to other systems and users. These new interfaces drive changes in procedures, contingency/disaster recovery plans, budget, and may require additional resources (hardware, software, development, test, installation, etc.). This impacts the development, support, and maintenance agencies.

## 7.2 Organizational Impacts

This section describes the anticipated operational impacts on the user, development, and support or maintenance agencies during operation of the proposed system. The extent of the organizational impacts is not known at this time however, it is anticipated that the following impacts will occur:

- Proposed enhancements to NAIMES will have a favorable impact on NAIMES users
  - Users will be able to begin the transition of their systems from legacy services and protocols to current protocols
  - NAIMES users will be able to take advantage of web services and help users move from point-to-point connections to a network-centric environment
- NAIMES development, support, and maintenance manning will increase to include the following:
  - Additional Windows and UNIX system administrators to field new servers, maintain software patches and upgrades, operate enterprise network management tools
  - One or more information system security personnel
  - Additional personnel to field NDS systems and for NDS systems maintenance
  - Additional personnel to install new software on servers

## 7.3 Impacts during Development

This section describes the anticipated impacts on the user, development, and support or maintenance agency or agencies during the development project for the proposed system. The extent of the impact of development activities is unknown however, it is anticipated that the following impacts will occur:

- Users, program management personnel, system engineers, developers, system administrators, network administrators, and others will be involved in studies, technical interchange meetings, and discussions
- Users, program management personnel, system engineers, developers, system administrators, network administrators, and others will be involved in test activities
- New procedures will need to be developed for Technical Support Help Desk personnel
- System downtime will be required when new systems are implemented

# 8 ANALYSIS OF PROPOSED SYSTEM CHANGES

This section provides an analysis of the benefits, limitations, advantages, disadvantages, and alternatives and trade-offs considered for the proposed system.

## 8.1 Summary of Improvements

This section provides a qualitative (and to the extent possible, quantitative) summary of the benefits to be provided by the proposed system.

### 8.1.1 New Capabilities

#### 8.1.1.1 Additional interfaces

The addition of new interfaces to sources of weather and aeronautical data will enhance the aeronautical and weather data available on NAIMES and will facilitate the migration of users away from legacy systems and protocols. The new interfaces will also allow FAA and DoD systems and users to process flight plans with NAIMES.

#### 8.1.1.2 IPv6 Transition/Implementation

Implementation of IPv6 capabilities will improve the security, quality of service, and network management of NAIMES and other NAS systems. Transitioning from IPv4 to IPv6 over a period of years will allow NAS users sufficient time to plan and budget for the transition as well as an adequate period of time to implement their transition.

#### 8.1.1.3 SPIRIT

The implementation of SPIRIT will improve the dissemination of valid aeronautical and flight-service data to the NAS using standard protocols.

### 8.1.2 Enhanced Capabilities

#### 8.1.2.1 NAS Gateway

Enhancements to the NAS Gateway will improve interoperability between legacy systems on NADIN and new or existing systems on FTI, NIPRNET, the FTI Administrative LAN and other

users. It will also provide a pathway for migrating new or existing systems away from legacy systems and protocols to modern standards and protocols.

#### 8.1.2.2 Enhanced Security and Adaptive Network Management

Many of the changes to NAIMES that are currently being implemented will enhance security and improve NAIMES' adaptive network management. Some of the enhancements discussed were HP Openview, Patchlink, Skybox View, and Arcsight Enterprise Security Manager.

#### 8.1.2.3 SLC Remote Site

Enhancements to the SLC remote site servers, communications equipment, and telecommunications will improve availability, scalability, and optimize system performance. Remote site enhancements will also provide a robust backup capability for core NAIMES products and services and allow for quicker failover to the remote site during contingency or disaster recovery procedures.

### 8.1.3 Deleted Capabilities

Not applicable.

### 8.1.4 Improved performance

All of the proposed additions and enhancements to NAIMES will result in improved performance.

## 8.2 Disadvantages and Limitations

This section provides a summary of the disadvantages and/or limitations of the proposed system.

The disadvantages and limitations of implementing the proposed changes include:

- New or existing systems external to NAIMES will have to develop or acquire new interfaces and application software for generating, parsing, transmitting, storing, and accessing XML-based data including SOAP. While this will require resources by each program, XML and SOAP isn't specific to any one application domain and they can be used by a wide variety of programming languages, computing platforms, applications and specifications.
- Additional resources will be required by NAIMES to implement the proposed changes. While this is listed as a disadvantage, the benefits to NAIMES users are expected to outweigh the costs.

## 8.3 Alternatives and Trade-offs Considered

This section describes alternatives to NAIMES components, products and services.

### 8.3.1 DoD NIPRNET Interfaces

NAIMES has NIPRNET interfaces at the ATCSCC and SLC remote site to provide support to the DoD. This interface allows the military to use of DINS, NES, USNS, and AISR to support the DoD's NOTAM and Flight Plan needs worldwide. The NIPRNET interface will also support JMPS in the future. The NIPRNET interface and NAIMES NIPRNET DMZ have completed the FAA's SCAP process and the DoD DITSCAP process. Moving NAIMES components, products,

and services outside of NAIMES would require additional NIPRNET connections and require additional security risk assessments.

### 8.3.2 Local NOTAM Database

Several systems external to NAIMES have been considered as alternative systems to USNS to host a national L NOTAM Database. Creation of a national L NOTAM database separate from NAIMES would duplicate the processing (collection, validation, distribution, delivery assurance, receipt acknowledgement, event reconstruction capabilities, etc.) already provided by USNS for D and FDC NOTAMs.

### 8.3.3 USNS

USNS is a joint FAA and DoD system that consists of USNS, the Master NOTAM database, the DINS, and the NES and is tightly coupled with AISR. USNS is operated jointly by the FAA and DoD. The operation of USNS within the FAA is governed by FAA Order 7930.2, Notices to Airmen. USNS is the authoritative source for US NOTAMs (except for L NOTAMs). USNS collects, validates, processes, and distributes NOTAM data to NAS, DoD, and International users. USNS also collects ICAO NOTAMs and provides those NOTAMs to NAS and DoD users. The military requires the use of DINS for NOTAM entry and retrieval. AISR is also the application the military uses for development and submission of flight plans. Removing USNS from NAIMES would have a serious impact on military flight operations and the efficient processing of NOTAM messages.

# 9 NOTES

## 9.1 Quality System

The NAIMES Quality Management System (QMS) achieved its initial International Organization for Standardization (ISO) 9001:2000 registration in August 2001. To continuously improve its ability to provide quality information and services to its customers, the NAIMES team adheres to the NAIMES QMS in all key process areas such as resource and configuration management, product realization process, measurement and analysis, and process improvement.

## 9.2 Configuration Control

Because of the close ties between the civil and military aspects of the program and to ensure the QMS is followed for all areas of the program, NAIMES incorporated a joint DoD/FAA NAIMES CCB within its CM process. This joint CCB has been established since 2000 to provide structured and streamlined control of each project within the program throughout its life cycle.

The NAIMES program follows the NAS CCB process for all CM activities in accordance with the latest revisions of the following FAA Orders:

- FAA Order 1800.66 Configuration Management Policy
- FAA Order 1800.8f National Airspace Configuration Management
- FAA Order 1800.57 National Airspace Configuration Control Board

**THIS PAGE INTENTIONALLY LEFT BLANK**

# Appendix A Glossary

| TERM | DESCRIPTION |
|---|---|
| 604 Circuit | A one-way, 1200 baud, multi-point circuit established in the early 1970's as a supplement to two-way teletype circuits from the weather message switching center (WMSC) in Kansas City. This circuit was replaced in 2005 by the AIDAP Portal. |
| Agency Data Telecommunications Network (ADTN) | ADTN or ADTN2000 is the name formerly used to refer to the FAA's wide area network (WAN) serving over 800 FAA sites and providing dial access for approximately 4000 active remote users. It is now referred to as the FTI Administrative Network. The network is used for day-to-day agency business management (e.g. payroll, personnel, and e-mail) and to serve some NAS systems/applications designated as mission support. |
| Automated Flight Service Station (AFSS) | Automated Flight Service Stations are air traffic facilities which provide pilot briefing, en route communications and visual flight rules (VFR) search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and NAS information, receive and process IFR flight plans, and monitor NAVAIDs. In addition, at selected locations, FSSs provide en route flight advisory service (flight watch), take weather observations, issue airport advisories, and advise Customs and Immigration of trans-border flights. |
| Aeronautical Information Distribution/Portal | The Aeronautical Information Distribution/Portal is a NAIMES web service that provides a seamless “one-stop” access to NAS data and aviation links for the FAA, DoD, specific airlines and public users. The Aeronautical Information Distribution/Portal has links to multiple NAS systems such as the ETMS, USNS, NOAA, DINS, and NASR. |
| Aeronautical Integrated Data Access Portal (AIDAP) | The Aeronautical Integrated Data Access Portal is a NAIMES web service that provides on-demand XML services for NOTAM and weather data using Internet based technologies. AIDAP replaced the legacy “604 Circuit.” |
| Aeronautical Information System-Replacement (AISR) | The Aeronautical Information System-Replacement is a web-enabled, automated means for the collection and distribution of Weather (Service A messages), Flight Plan |

| TERM | DESCRIPTION |
|---|---|
| | Data, NOTAM alerts, PIREPs and other operational information (Service B messages) with all equipped FAA facilities. AISR is a direct replacement of AIS program. Reference the AISR chapter in this document for more information regarding AISR. |
| Altitude Reservation (ALTRV) | An ALTRV is a system used by the military to reserve airspace (altitude and route) for the movement of aircraft or special missions that cannot be accomplished otherwise using standard ATC separation. An ALTRV will not be requested if the mission can be accomplished without an ALTRV and undue degradation of operations that normally are conducted in airspace specifically designated for a special activity. The altitude reservations are made utilizing the CARF system. |
| Air Route Traffic Control Center (ARTCC) | An ARTCC is a facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. |
| Air Traffic Control (ATC) | ATC is a service operated by an appropriate authority to promote the safe, orderly, and expeditious flow of air traffic. |
| Air Traffic Control Tower (ATCT) | An Air Traffic Control Tower is a terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. Air Traffic Control Towers authorize aircraft to land or takeoff at the airport controlled by the tower or to transit the Class D airspace area regardless of flight plan or weather conditions (IFR or VFR). A tower may also provide approach control services (radar or non-radar). |
| Air Traffic Control System Command Center (ATCSCC) | The Air Traffic Control System Command Center is an Air Traffic Tactical Operations facility responsible for monitoring and managing the flow of air traffic throughout the NAS, producing a safe, orderly, and expeditious flow of traffic while minimizing delays. The functions located at the ATCSCC include the CARF office, the Airport Reservation Office (ARO), the USNOF, and a weather unit. |
| Air Traffic Query System (A-TQS) | The A-TQS is a web-based application that was developed to provide users with an easy to use ETMS-based tool to track any commercial flight in the continental USA. It provides the both textual and graphical information on the status of any commercial flight over the continental U.S. |

| TERM | DESCRIPTION |
|---|---|
| | The A-TQS results page graphically displays the filed flight plan information (from HOST), actual aircraft location (from ETMS), and NEXRAD information. |
| Certification & Authorization (C&A) | Security C&A are important activities that support the information security risk management process and are an integral part of an agency's information security program.<br><br>Security certification is a comprehensive assessment of the management, operational, and technical security controls in an information system, made in support of security accreditation, to determine the extent to which the controls are implemented correctly, operating as intended, and producing the desired outcome with respect to meeting the security requirements for the system.<br><br>Security authorization (synonymous with security accreditation ) is the official management decision given by a senior agency official to authorize operation of an information system and to explicitly accept the risk to agency operations, agency assets, or individuals based on the implementation of an agreed-upon set of security controls. |
| Central Altitude Reservation Function (CARF) | The CARF office is responsible for coordinating, planning, and approving special user requirements under the ALTRV concept. |
| Collaborative Decision Making (CDM) | CDM is a cooperative effort between the various components of aviation transportation, both government and industry, to exchange information for better decision making. |
| Domestic (D) NOTAM | A D NOTAM is a notice distributed by means of telecommunications containing information concerning the establishment, condition, or change in any aeronautical facility, service, procedure, or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.<br><br>FAA Order 7930.2, Notices to Airmen, establishes D NOTAM criteria. In general, a D NOTAM pertains to en route navigational aids, civil public-use airports listed in the airport facility directory, facilities, services, and procedures. |
| Digital Aeronautical Flight Information File (DAFIF) | The DAFIF is a product of the NGA. The DAFIF is an unclassified flight information database incorporating U.S. Military-selected aeronautical data similar to that published in the DoD Flight Information Publications (FLIP). |
| Defense Internet NOTAM | DINS is a NAIMES service that is an USNS component. |

| TERM | DESCRIPTION |
|---|---|
| Service (DINS) | The DINS system incorporates many features to assist the user when retrieving NOTAM requests. Real-time NOTAM data is available, and DINS contains all NOTAMs validated by the USNS, which includes domestic, international, military and FDC NOTAMs. DoD requires the use of DINS for NOTAM input and display.<br><br>The DINS system will allow users to request NOTAM information in either raw text or report text format. Raw Text is the international machine readable ICAO format with multiple report fields, NOTAM series, and NOTAM numbers displayed. Report text is the translated NOTAM summary format which aircrews find desirable. Report text format will also insert a blank line between each NOTAM to improve their readability. |
| Direct User Access Terminal System (DUATS) | The DUATS is an FAA funded service for pilots. This service provides direct access to weather briefing, flight planning, and flight plan filing information to allow pilots to obtain a self briefing and file a flight plan prior to flying. The service is free to qualified pilots, dispatchers, and other authorized users. DUATS can be accessed by pilots with a current medical certificate toll-free in the 48 contiguous states via a personal computer with an Internet connection or via a toll-free number. |
| En Route Information Display System (ERIDS) | ERIDS is an information system on an auxiliary display located at the sector level within an ARTCC that off-loads many functions currently being handled by Host and adds many other new functions for ATC use. |
| Enhanced Traffic Management System (ETMS) | ETMS is a system developed by the FAA that helps traffic management coordinators (TMCs) respond strategically to situations across the NAS, rather than focusing on local solutions based on incomplete data. Specifically, this system allows TMCs to track, predict, and plan air traffic flow, analyze ground delay effects, and evaluate alternative routing strategies. |
| Federal Contract Tower (FCT) | A FCT is an ATCT that uses contracted air traffic control services at low-activity visual flight rules towers. |
| Flight Data Center (FDC) NOTAM | FDC NOTAMs are flight information NOTAMs that are regulatory in nature including, but not limited to, changes to IFR charts, procedures, and airspace usage, and not tied to a specific airport/facility; i.e. flight advisories and restrictions. |
| FAA IP-Routed Multi-user Network (FIRMNet) | The FIRMNet is an IP-routed WAN, initially implemented primarily on the Bandwidth Manager (BWM) platform. FIRMNet IP packets are routed over the BWM circuit- |

| TERM | DESCRIPTION |
|---|---|
| | switched virtual connections, using the FAA-owned and leased trunks for transmission. The WAN is physically isolated from any devices/networks connected to the Internet. The FIRMNet is physically separated from the ADTN/FTI Administrative Network with FAA Security approved firewalls in use to allow access between the ADTN and the FIRMNet on a case-by-case. |
| Flight Plan | A flight plan is information relating to the intended flight of an aircraft that is filed orally or in writing with an FSS/AFSS, through DUATS, through AISR, or other authorized ATC facility/service. |
| Future Telecommunications Infrastructure (FTI) | FTI provides a modern, highly reliable, consolidated network infrastructure for the FAA. FTI employs routing and switching-based technologies in combination with traditional dedicated circuits to achieve more efficient bandwidth utilization. FTI provides the full range of telecommunications services required by existing and future FAA programs and to provide those services at market-competitive prices. The FTI network conforms to the NAS Architecture and provides the FAA a means for obtaining the required services consistent with the NAS Architecture in that it supports inter-facility, intra-facility, and mobile communications services. |
| General Aviation (GA) | That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of public convenience and necessity from the Civil Aeronautics Board and large aircraft commercial operators. |
| Geographical Information System (GIS) | A GIS System is a technology that is used to view and analyze data from a geographic perspective. |
| Global Positioning System (GPS) | GPS is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the DoD. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS.<br><br>GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the |

| TERM | DESCRIPTION |
|---|---|
| | receiver can determine the user's position and display it on the unit's electronic map. |
| Graphical Temporary Flight Restriction (GTFR) | A GTFR is a representation of a type of FDC NOTAM message. A GTFR defines an area restricted to air travel due to a hazardous condition, a special event, or a general warning for the entire FAA airspace and is depicted geographically. The text of the actual TFR contains the fine points of the restriction. |
| Internet Access Point (IAP) | IAPs are access points to and from FAA Networks to Internet that are provided through commercial ISPs. There are currently eight recognized IAPs in use by the agency: Washington Headquarters, Mike Monroney Aeronautical Center, Western-Pacific Region, William J. Hughes Technical Center, Eastern Region, Great Lakes Region, Alaskan Region, and the Herndon ATCSCC. |
| International Civil Aviation Organization (ICAO) | The ICAO, an agency of the United Nations, develops the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth. The ICAO Council adopts standards and recommended practices concerning air navigation, prevention of unlawful interference, and facilitation of border-crossing procedures for international civil aviation. |
| Intrusion Detection System (IDS) | An IDS inspects all inbound and outbound network activity and identifies suspicious patterns that may indicate a network or system attack from someone attempting to break into or compromise a system. An IDS evaluates a suspected intrusion once it has taken place and signals an alarm. An IDS also watches for attacks that originate from within a system. |
| Institute of Electrical and Electronics Engineers (IEEE) | The IEEE is a global technical professional society serving the public interest and members in electrical, electronics, computer, information, and other technologies. |
| Internet Protocol (IP) | IP is a networking protocol that specifies the format of packets, also called datagrams, and the addressing scheme. IP datagrams are considered connectionless. Most networks using the IP protocol combine it with a higher-level protocol called TCP, which establishes a virtual connection between a destination and a source.<br><br>IP by itself is something like the postal system. It allows you to address a package and drop it in the system, but there's no direct link between you and the recipient. TCP is more like a telephone call and establishes a connection between two hosts so that they can send messages back and |

| TERM | DESCRIPTION |
|---|---|
| | forth for a period of time.<br><br>The current version of IP used throughout the Internet is IPv4. A new version, called IPv6 or IPng, has been developed and is gradually being implemented. |
| Java 2 Platform, Enterprise Edition (J2EE) | J2EE is a platform-independent, Java-centric environment from Sun for developing, building and deploying Web-based enterprise applications online. The J2EE platform consists of a set of services, APIs, and protocols that provide the functionality for developing multi-tiered, web-based applications. |
| Local L NOTAM | L NOTAMs are notices that meet certain criteria of FAA Order 7930.2, Notices to Airmen, and require local dissemination. |
| Model 1 Full Capacity (M1FC) | M1FC is a FSAS used by ATC Specialists to provide flight service functionality for the aviation community. The primary services provided by M1FC are the filing and processing of flight plans and flight information and providing pilots and aircrew with NOTAM and weather data briefings. The current FSAS is the M1FC system, comprised of two AWPs, 21 FSDPS, and the workstation terminal equipment located at 61 AFSSs. |
| Military Base Operations (MBO) | MBOs refer to an office at a military airfield that performs military airfield management functions. MBO personnel typically are responsible for ordering and stocking FLIP Publications and charts; issuing, modifying, and canceling Military NOTAMs; printing and posting NOTAMs and other materials in flight planning rooms; and filing, modifying, and canceling flight plans; and other duties. |
| Message Switched Network (MSN) | A MSN is a transmission system which uses an intermediate point for the storage and forwarding of messages between two communicating systems. The NADIN MSN satisfies requirements of the ICAO, such as the message store-and-forward function, handling of message priorities, and alternate routing of messages. Users have been gradually transitioning, over the past several years, to interfaces as X.25, IP tunneling or encapsulation, and Frame Relay. |
| NAS Aeronautical Information Language (NAIL) | NAIL is a NAS/DoD-specific superset of AIXM. |
| NAS Aeronautical Information Management Enterprise System (NAIMES) | NAIMES is a safety-critical integrated aeronautical information. The NAIMES Program includes NASR, USNS, AISR, DINS, the NES, and the NAS IAP. NAIMES collects aeronautical data and information at the source, ensuring its validity, and then disseminating |

| TERM | DESCRIPTION |
|---|---|
| | accurate and timely aeronautical information to all of the users. Data duplication is eliminated and a single entry point is established for accessing all FAA aeronautical information. |
| National Airspace Data Interchange Network (NADIN) | The NADIN is part of the data-switching sub-element of the NAS communications systems. NADIN provides high-speed data communications among subsystems in the NAS and authorized non-FAA users requiring access and/or input to FAA weather-related and special purpose data (sometimes called "Service A") and/or flight planning and related information ("Service B"). |
| National Airspace System (NAS) | The NAS is the common network of US airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and human resources and material. Included are system components shared jointly with the military. |
| NAS Resources (NASR) | NASR refers to the NAS data and information used by the FAA to produce various aeronautical publications. Information regarding airports, runways, navigational aides, instrument landing systems, fixes, airways, military training routes, towers, and the remaining fixed assets of the NAS are stored in the system's relational database.<br><br>NASR consists of fixed aeronautical information<br>• Runways<br>• Airway<br>• ARTCC<br>• ASOS/AWOS<br>• Consolidated TRACON<br>• AFSS/FSS<br>• Holding patterns<br>• ILS<br>• Location Identifiers<br>• Microwave Landing System (MLS)<br>• MTR<br>• Parachute Jump areas<br>• Preferred Routes (PFR)<br>• Standard Instrument Departure (SID)/Standard Terminal Arrival Routes (STAR)<br>• SUA<br>• Tower<br>• Weather<br>• Navigational Aids |

| TERM | DESCRIPTION |
|---|---|
| Navigational Aid (NAVAID) | A NAVAID is any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight. |
| National Flight Data Center (NFDC) | NFDC is the principal element within the FAA responsible for collecting, collating, validating, storing, and disseminating aeronautical information detailing the physical description and operational status of all components of the NAS. NFDC maintains the national aeronautical information database and provides aeronautical information to government, military, and private producers of aeronautical charts, publications, and flight management systems. NFDC is responsible for managing and assigning location identifiers for airports, navigational aids, communications facilities, and weather stations, as well as five-letter fix names, in the NAS. |
| NOTAM Distribution System (NDS) | The NDS refers to a Java-based client/server program that disseminates NOTAM messages directly to FAA facilities. The NDS program bypasses legacy distribution systems by using FIRMNet and FTI communications. NDS provides guaranteed delivery of NOTAMs to the facility and positive receipt acknowledgement. Failure to acknowledge receipt of a NOTAM within a predetermined time period will result in an alert being sent to the site that originated the NOTAM. Help desk support is provided by the NAIMES Technical Support Help Desk. |
| NOTAM IP | The NOTAM IP system supports the FAA FCT Program. This program uses technology developed by the FAA for the DoD-- DINS. NOTAM IP provides FCTs with web query capability for D and FDC NOTAM messages. Help desk support is provided by the NAIMES Technical Support Help Desk. |
| NOTAM Entry System (NES) | NES is a web-based application that allows authorized users to enter draft or candidate TFRs. The candidate TFRs are then forwarded to the USNOF for entry into the USNS. The system is currently being used to enter FDC, TFR and Center NOTAMS. |
| Notices to Airmen (NOTAM) | A NOTAM is a notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations. NOTAMs typically remain in effect until the condition is resolved or until related aeronautical charts and publications have been amended. |

| TERM | DESCRIPTION |
|---|---|
| Operational and Sustainability Implementation System (OASIS) | OASIS is a FSAS planned to replace M1FC equipment. OASIS has been fielded to 16 AFSSs but further deployment is on hold. OASIS is being replaced by FS-21. |
| Pilot Report (PIREP) | A PIREP is a report of observations made by a pilot in flight. PIREPs vary in content and priority. PIREPs typically include the following type of information if available:<br>• Heading<br>• Position<br>• Altitude<br>• Type of aircraft<br>• Sky condition<br>• Temperature<br>• Wind speed<br>• Turbulence<br>• Icing<br>• Remarks |
| Packet Switched Network (PSN) | A PSN is any common carrier network that provides circuit switching (a method of routing packets/datagram traffic through a switching center, from local users or from other switching centers, whereby a connection is established between the calling and called stations until the connection is released by the called or calling station) among public users. |
| Route Management Tool (RMT) | The RMT manages and display several route-related databases. Using RMT, users manage the databases for both coded departure routes (CDRs) and advanced navigation routes (ANRs). In addition to viewing database information, uses can add to or modify the operational and staging databases. CDRs are used to reduce coordination time during severe weather or departure congestion events and to standardize route coordination for the user community. ANRs are advanced navigation routes, which use the concept of area navigation and eliminate the need for aircraft to over-fly ground-based navigational aids. In addition, RMT allows users to view released NFDC tables such as preferred routes, location identification and airway intersections. |
| Security Certification and Authorization Package (SCAP) | The SCAP is the collection of documents that show proof of appropriate security (physical, personnel, and computer security). Several documents make up the SCAP:<br>• Certification Statement<br>• Executive Summary<br>• Risk Assessment Report |

| TERM | DESCRIPTION |
|---|---|
| | • Risk Mitigation/Remediation Plan<br>• Information Systems Security Plan (ISSP)<br>• C/DRP<br>• Master Test Plan and Test Results Report |
| Structured Query Language (SQL) | SQL is a standardized query language for requesting information from a database. |
| Secure Shell (SSH) | SSH is a program to log into another computer over a network, to execute commands in a remote machine, and to move files from one machine to another. SSH provides strong authentication and secure communications over insecure channels. It is a replacement for rlogin, rsh, rcp, and rdist. |
| Secure Sockets Layer (SSL) | SSL is a protocol developed by Netscape for transmitting private documents via the Internet. SSL uses a cryptographic system that uses two keys to encrypt data − a public key known to everyone and a private or secret key known only to the recipient of the message. |
| Special Use Airspace (SUA) | SUA is airspace of defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities |
| Transmission Control Protocol (TCP) | TCP is a highly reliable host-to-host protocol between hosts in packet-switched computer communication networks, and in interconnected systems of such networks. TCP is a connection-oriented, end-to-end reliable protocol designed to fit into a layered hierarchy of protocols which support multi-network applications. The TCP provides for reliable inter-process communication between pairs of processes in host computers attached to distinct but interconnected computer communication networks. |
| Terminal Instrument Procedures (TERPS) | TERPS are procedures for instrument approaches and departure of aircraft to and from civil and military airports. There are four types of terminal instrument procedures: precision approach, non-precision approach, circling, and departure. |
| Temporary Flight Restriction (TFR) | A TFR is a type of FDC NOTAM message. A TFR defines an area restricted to air travel due to a hazardous condition, a special event, or a general warning for the entire FAA airspace. The text of the actual TFR contains the fine points of the restriction. |
| Terminal Radar Approach Control (TRACON) | A TRACON is a terminal ATC facility that uses radar and non-radar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility. This facility provides radar ATC |

| TERM | DESCRIPTION |
|---|---|
| | services to aircraft operating in the vicinity of one or more civil/military airports in a terminal area. A radar approach control facility may be operated by FAA or a military service, or jointly. Specific facility nomenclatures are used for administrative purposes only and are related to the physical location of the facility and the operating service generally. |
| United States NOTAM Office (USNOF) | The USNOF is the office responsible for monitoring the USNS. |
| United States NOTAM System (USNS) | The USNS is a safety-critical system that collects, maintains, and distributes NOTAM messages for the aviation community. NOTAM messages provide information on temporary and immediate changes to the condition of any aeronautical facility, service, procedure, or component (e.g. runways, navigational aids, lighting) involved in flight operations.<br><br>The USNS is a joint civil/military aeronautical information management system that consists of the NOTAM Master Database and the USNOF, which includes the FAA NOTAM Specialists and military NOTAM coordinators. |
| Virtual Private Network (VPN) | A VPN is a private network that uses a public network (usually the Internet) to connect remote sites or users together. Instead of using a dedicated, real-world connection such as leased line, a VPN uses "virtual" connections routed through the Internet from the company's private network to the remote site or employee. |
| Wide Area Augmentation System (WAAS) | The WAAS augments the DoD GPS Standard Positioning Service (SPS). This enables use of the GPS satellite constellation for precise guidance by civil and military aircraft operating in the NAS. WAAS increases the navigation accuracy of GPS. |
| Extensible Markup Language (XML) | XML is a simple, very flexible text format derived from Standard Generalized Markup Language (SGML). Originally designed to meet the challenges of large-scale electronic publishing, XML is also playing an increasingly important role in the exchange of a wide variety of data on the Web and elsewhere. |

# Appendix B Acronyms

| ACRONYM | NAME OF ACRONYM |
|---|---|
| AAA | Airport Airspace Analysis |
| ACE | Automated Surface Observing System (ASOS) Controller Equipment |
| ACE-IDS | Automated Surface Observing System (ASOS) Controller Equipment Information Display System |
| ADAS | AWOS Data Acquisition System |
| ADTN | Agency Data Telecommunications Network |
| AF | Airway Facilities |
| AFMSS | Air Force Mission Support System |
| AFRL | Air Force Research Laboratory |
| AFSS | Automated Flight Service Station |
| AFTN | Aeronautical Fixed Telecommunications Network |
| AI | Aeronautical Information |
| AICM | Aeronautical Information Conceptual Model |
| AIDAP | Aeronautical Integrated Data Access Portal |
| AIIH | Assignment of IPv4 Global Addresses to IPv6 Hosts |
| AIM | Aeronautical Information Management |
| AIS | Aeronautical Information System |
| AISR | Aeronautical Information System Replacement |
| AIXM | Aeronautical Information Exchange Model |
| ALTRV | Altitude Reservation |
| AMC | Air Mobility Command |
| ANR | Advanced Navigation Routes |
| AOC | Airline Operations Center |
| AOPA | Airline Owners and Pilots Association |
| API | Application Programming Interface |
| ARO | Airport Reservation Office |
| ARTCC | Air Route Traffic Control Center |
| ASOS | Automated Surface Observing System |
| ATC | Air Traffic Control |
| ATCT | Air Traffic Control Tower |
| ATCSCC | Air Traffic Control System Command Center |
| ATO | Air Traffic Organization |
| ATO-R | Air Traffic Organization, System Operations Services |
| A-TQS | Air Traffic Query System |

| ACRONYM | NAME OF ACRONYM |
|---|---|
| ATS | Air Traffic Services |
| AUTODIN | Automatic Digital Network |
| AWOS | Automated Weather Observing System |
| AWP | Aviation Weather Processor |
| BWM | Bandwidth Manager |
| C4 | Command, Control, Communications, and Computers |
| C4ISR | Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance |
| C&A | Certification & Authorization |
| CAASD | Center for Advanced Aviation System Development |
| CARF | Central Altitude Reservation Function |
| CCA | Clinger-Cohen Act |
| CCB | Configuration Control Board |
| CDM | Collaborative Decision Making |
| CD-ROM | Compact Disk-Read Only Memory |
| C/DRP | Contingency/Disaster Recovery Procedures |
| CDR | Coded Departure Routes |
| CERAP | Combined En Route Radar Approach Control |
| CFR | Code of Federal Regulations |
| CIO | Chief Information Officer |
| CM | Configuration Management |
| CNS | Communications, Navigation, and Surveillance |
| CNS | Consolidated NOTAM System |
| COE | Common Operating Environment |
| CONOPS | Concept of Operations |
| CORBA | Common Object Request Broker Architecture |
| COTS | Commercial-off-the-shelf |
| CSIRC | Computer Security Information Response Center |
| d-TPP | Digital Terminal Procedure Publication |
| D NOTAM | Domestic NOTAM |
| DAA | Designated Approving Authority |
| DAFIF | Digital Aeronautical Flight Information File |
| DAI | Digital Aeronautical Information |
| DACS | Digital Aeronautical Chart Supplement |
| DBA | Database Administrator |
| DII | Defense Information Infrastructure |
| DINS | Defense Internet NOTAM Service |
| DIRMM | Departmental Information Resource Management Manual |
| DISA | Defense Information Systems Agency |

| ACRONYM | NAME OF ACRONYM |
|---|---|
| DITSCAP | DoD Information Technology Security Certification and Accreditation Process |
| DMZ | De-militarized Zone |
| DNS | Domain Name System |
| DoD | Department of Defense |
| DOI | Department of the Interior |
| DoS | Denial of Service |
| DOS | Disk Operating System |
| DOT | Department of Transportation |
| DTI | Dynamic Tunneling Interface |
| DUATS | Direct User Access Terminal System |
| EDS | Electronic Data Systems |
| eNASR | Electronic National Airspace System Resources |
| EAA | Experimental Aircraft Association |
| ERAM | En Route Modernization Program |
| ERIDS | En Route Information Display System |
| e-STMP | Special Event Reservation |
| ETMS | Enhanced Traffic Management System |
| FAA | Federal Aviation Administration |
| FCT | Federal Contract Tower |
| FDC | Flight Data Center |
| FEMA | Federal Emergency Management Agency |
| FIPS | Federal Information Processing Standard |
| FIRMNet | FAA IP-Routed Multi-user Network |
| FIS | Flight Information Service |
| FISCAM | Federal Information System Control Audit Manual |
| FISDL | Flight Information Services Data Link |
| FISMA | Federal Information Security Management Act |
| FLIP | Flight Information Publication |
| FOC | Full Operational Capability |
| FOIA | Freedom of Information Act |
| FOUO | For Official Use Only |
| FPC | Federal Preparedness Circular |
| FRP | Federal response Plan |
| FSAS | Flight Service Automation System |
| FSDPS | Flight Service Data Processing System |
| FS-21 | Flight Service 21 |
| FSOSC | Flight Services Operations Support Center |
| FSS | Flight Service Station |

| ACRONYM | NAME OF ACRONYM |
|---|---|
| FTI | Future Telecommunications Infrastructure |
| FTP | File Transfer Protocol |
| FY | Fiscal Year |
| GA | General Aviation |
| GAO | General Accountability Office |
| GB | Gigabyte |
| GEOREF | Geographic Reference System |
| GIS | Geographical Information System |
| GMGO | German Military Geophysical Office |
| GPEA | Government Paperwork Elimination Act |
| GPRA | Government Performance and Results Act |
| GPS | Global Positioning System |
| GTFR | Graphical Temporary Flight Restriction |
| HP | Hewlett-Packard |
| HTML | Hypertext Markup Language |
| HTTP | Hypertext Telecommunications Protocol |
| HTTPS | Secure Hypertext Telecommunications Protocol |
| IAP | Internet Access Point |
| ICAO | International Civil Aviation Organization |
| IDS | Intrusion Detection System |
| IEEE | Institute of Electrical and Electronics Engineers |
| IETF | Internet Engineering Task Force |
| IFR | Instrument Flight Rules |
| ILS | Instrument Landing System |
| IP | Internet Protocol |
| IPv4 | IP Version 4 |
| IPv6 | IP Version 6 |
| ISO | International Organization for Standardization |
| ISP | Internet Service Provider |
| ISS | Information System Security |
| ISSM | Information System Security Manager |
| ISSO | Information System Security Officer |
| ISSP | Information System Security Plan |
| IT | Information Technology |
| J2EE | Java 2 Platform, Enterprise Edition |
| JMPS | Joint Mission Planning System |
| JTA | Joint Technical Architecture |
| L NOTAM | Local NOTAM |
| LABS | Leased A and B Services |

| ACRONYM | NAME OF ACRONYM |
|---|---|
| LAN | Local Area Network |
| M1FC | Model 1 Full Capacity |
| MBO | Military Base Operations |
| MFD | Multi-function Display |
| MILOPS | Military Operations |
| MNS | Mission Needs Statement |
| MSN | Message Switched Network |
| MTR | Military Training Route |
| NACO | National Aeronautical Charting Office |
| NADIN | National Airspace Data Interchange Network |
| NAIMES | NAS Aeronautical Information Management Enterprise System |
| NAIL | NAS Aeronautical Information Language |
| NAIS | National Aeronautical Information Service |
| NAS | National Airspace System |
| NASA | National Aeronautics and Space Administration |
| NASR | National Airspace System Resources |
| NAT | Network Address Translation |
| NATCOM | National Communications Center |
| NAVAID | Navigational Aid |
| NBAA | National Business Aviation Association |
| NDS | NOTAM Distribution System |
| NES | NOTAM Entry System |
| NEXRAD | Next Generation Radar |
| NFD | National Flight Database |
| NFDC | National Flight Data Center |
| NFDD | National Flight Data Digest |
| NGA | National Geospatial-Intelligence Agency |
| NGIT | Northrop Grumman Information Technology |
| NGS | National Geodetic Survey |
| NIC | Network Information Center |
| NIMAAC | National Imagery & Mapping Agency Aerospace Center |
| NIPRNET | Non-Secure Internet Protocol Router Network |
| NIST | National Institute of Standards and Technology |
| NNCC | National Network Control Center |
| NOAA | National Oceanographic and Atmospheric Administration |
| NOC | Network Operations Center |
| NODA | National Operational Data Archive |
| NOTAM | Notices to Airmen |

| ACRONYM | NAME OF ACRONYM |
|---|---|
| NPA | Non-precision Approach |
| NWS | National Weather Service |
| OASIS | Operational and Sustainability Implementation System (OASIS) |
| ODMS | Operational Data Management System |
| OE/AAA | Obstruction Evaluation/Airport Airspace Analysis |
| OIS | Operational Information System |
| OMB | Office of Management and Budget |
| OST | Optimal Solutions & Technologies |
| PC | Personal Computer |
| PDD | Presidential Decision Directive |
| PDF | Portable Document Format |
| PFPS | Portable Flight Planning Software |
| PFR | Preferred Routes |
| PIN | Personal Identification Number |
| PIREP | Pilot Report |
| PIV | Personal Identity Verification |
| PR | Problem Report |
| PRA | Paperwork Reduction Act |
| PSN | Packet Switched Network |
| QA | Quality Assurance |
| QICP | Qualified Internet Communication Provider |
| QMS | Quality Management System |
| QoS | Quality of Service |
| RAPCON | Radar Approach Control |
| RDBMS | Relational Database Management System |
| RMT | Route Management Tool |
| ROI | Return on Investment |
| RVR | Runway Visual Range |
| RVSM | Reduced Vertical Separation Minimum |
| SAIDS4 | Systems Atlanta Information Display System 4 |
| SCAP | Security Certification and Authorization Package |
| SF-21 | Safe Flight 21 |
| SID | Standard Instrument Departure |
| SIIT | Stateless IP/ICMP Translator |
| SFTP | Secure FTP |
| SGML | Standard Generalized Markup Language |
| SLC | Salt Lake City |
| SNAT | Secure Network Address Translation |

| ACRONYM | NAME OF ACRONYM |
|---|---|
| SOAP | Service Oriented Architecture Protocol |
| SPIRIT | Service-Oriented Architecture (SOA) Portal for Information Resources based on Integrated Technologies |
| SQL | Structured Query Language |
| SR | System Requirements |
| SRAC | Sectional Raster Aeronautical Chart |
| SSH | Secure Shell |
| SSL | Secure Sockets Layer |
| STAR | Standard Terminal Arrival Route |
| SUA | Special Use Airspace |
| SUI | Sensitive Unclassified Information |
| SWIM | System-Wide Information Management |
| SYN | Synchronization |
| TAMPS | Tactical Aircraft Mission Planning System (TAMPS) |
| TCP | Transmission Control Protocol |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TERPS | Terminal Instrument Procedures |
| TFM | Traffic Flow Management |
| TFR | Temporary Flight Restriction |
| TM | Traffic Management |
| TMC | Traffic Management Coordinator |
| ToS | Type of Service |
| TRACON | Terminal Radar Approach Control |
| TSA | Transportation Security Agency |
| UAT | User Acceptance Testing |
| UDDI | Universal Description, Discovery, and Integration |
| UDP | User Datagram Protocol |
| URL | Uniform Resource Locator |
| U.S.C. | United States Code |
| USFS | Untied States Forestry Service |
| USGS | United States Geological Survey |
| USNOF | United States NOTAM Office |
| USNS | United States NOTAM System |
| VDL | Very High Frequency Digital Link |
| VFR | Visual Flight Rules |
| VHF | Very High Frequency |
| VOR | Very High Frequency (VHF) Omni-directional Range |
| VPN | Virtual Private Network |
| WAAS | Wide Area Augmentation System |

| ACRONYM | NAME OF ACRONYM |
|---|---|
| WAN | Wide Area Network |
| WJHTC | William J Hughes Technical Center |
| WSDL | Web Services Description Language |
| WMSC | Weather Message Switching Center |
| WMSCR | Weather Message Switching Center Replacement |
| WSI | Weather Services International |
| XML | Extensible Markup Language |